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STREET CLEANING IN GERMAN CITIES*

Regulations for Non-littering of Streets by Citizens Rigidly Enforced—Smooth Pavements Make Thorough Cleansing Possible and Easy—Removal of All Refuse

By Howard Woodhead

FOR promoting cleanliness and healthfulness in the city the cleaning of streets and removal and disposal of sweepings and garbage occupy a position second in importance to drainage and sewerage only. Street paving should also be mentioned, not only because thorough cleansing is possible where there is good pavement; but also because properly constructed pavement is an integral part of the drainage system, leading away the rain-water, etc., and preventing contamination of the ground with disease germs. Street cleaning aids the work thus begun by street paving, and, further, prevents contamination of the air by the dissemination of the disease-breeding foulness of the streets. Recognizing the importance of this branch of municipal activity, the Germans have given careful study to the problems presented and have developed a science of street cleaning. The cleaning of the streets formerly was—and in some cities still is, more or less—in private hands; but this does not mean that the cleaning was left to private initiative, for regular times for cleaning and regular rules to be followed were enforced. Disadvantages recognized in this system, however, have led to a gradual municipalization of the work. Street cleaning, as undertaken by the German municipalities is a business, not a charity, be it understood.

Promptness and thoroughness in doing the work; and relative saving of time and money, are some of the advantages of centralized municipal street cleaning. A central bureau does the office work and has general direction of the whole department. For the practical execution of the work the city is divided into districts. In charge of each district is a superintendent with a force of workmen organized into "gangs" and "flying columns." Each district has a central depot in which are the office of the district superintendent, and housing for the various implements, tools, sprinklers, sweepers, collecting wagons, carts, etc. Uniforms—or, at least, uniform caps—are provided for all connected with the work. In Dresden, the general director of the department and the twelve district superinendents are salaried municipal employees; the workmen—467 regularly employed in 1901—are paid by the day. The wages for a ten-hour day are 3.20 marks to 4:50 marks. In other cities conditions are similar. Berlin employs, for the most part, youths under twenty-one years of age—large, strong fellows, ready for work—especially for the day work in the "flying columns." They work for less than men's wages, but with efficiency. In Hamburg, military discipline is maintained in the street-cleaning department. For superintendents, ex-sergeants are chosen, and for the men, only those who have had the military training which the German compulsory military service assures.

Because of technical and financial advantage to be derived therefrom, there is a tendency toward unification, under a centralized direction of all the branches of the city cleaning. Thus the street cleaning department of Hamburg takes charge of the cleaning of all streets within the city limits, of street sprinkling, of removal of snow and ice from the streets, of cleaning public lavatories; oversees the collection of garbage by private contractors, and operates a garbage crematory; further, it cares for the removal of rubbish from the ships, docks, and harbors, and for the cleaning of such cesspools as still exist, with the removal of the material.

Dresden's department cleans and sprinkles the streets and squares, removes snow and ice from streets and squares and sidewalks, removes the sludge from the sewer catch-basins under gutters and street-car rails. In Frankfurt a.M. the street cleaning department and the municipal stables are organized under one department chief. This gives a centralized organization which has full control of the following work: maintenance of macadam streets and walks; cleaning and sprinkling of, including removal of snow and ice from, all paved streets and squares within the city limits; the cleaning of all drainage and boundary ditches, e. g., on municipal land; the cleaning and maintenance of public lavatories; the

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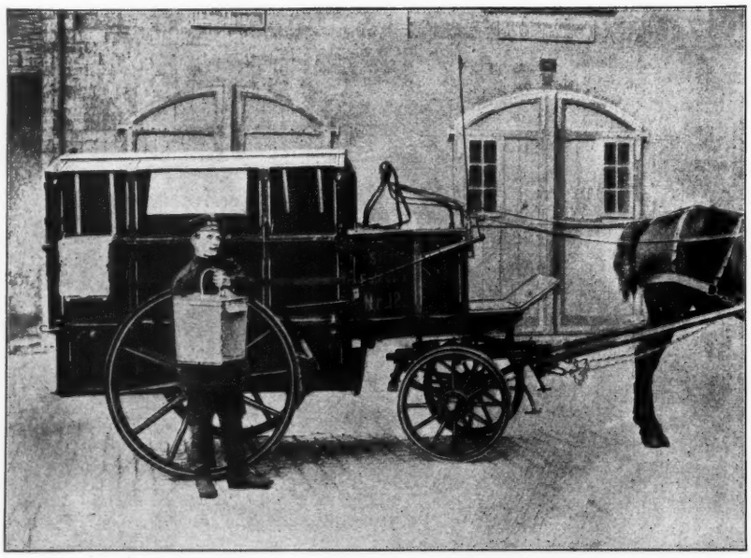
removal of street sweepings; the cleaning of the municipal market-halls and removal of the rubbish; the removal of garbage and ashes. There is a recent tendency to include the flushing of sewers as a part of the work of the street cleaning department.

Street cleaning may be considered under two headings: cleaning the streets and keeping the streets clean. The cleaning of the streets is very thorough and of frequent occurrence. In Berlin the chief streets are cleaned six times a week, the majority of the rest, three times, and the remainder —streets in the outlying districts where the amount of traffic is minimal—at least once a week. In Frankfort a. M. the conditions are similar. In Dresden every street in the city is cleaned every day in the week—with the exception of the macadam roads which are not under the control of the street cleaning department, but are cleaned by the same gang which cares for the maintenance and repair of them. The cleaning of the streets is done at night or in the early morning hours, in order to interfere with the traffic as little as possible. Stone-block pavements are cleaned by machines. Frankfort a.M. employs eight gangs, each consisting of fifteen men, with one sprinkling wagon, two street sweeping machines, and two collecting wagons. Each gang is in charge of a boss (Rottenfuhrer) and his assistant. The sprinkling wagons start out at 9:30 P. M. the sweeping machines at 10 P. M., the collecting wagons at 10:30 P. M. The men begin work at 10 P. M., and work, with a pause of an hour and a half, until 8 A. M. In Dresden the cleaning is done between 4 A. M. and 3:30 P. M.; in winter, 5 A. M. and 4:30 P. M. The chief thoroughfares are all cleaned during the first five hours of work, so as to be clean before heavy traffic begins. The street cleaning department of Dresden exhibited a most interesting and complete equipment of machines, utensils, and tools. This department uses interchangeable sprockets on the sweeping machines, and is thus able to raise the gear as the brushes are worn down. The more rapid the revolution thus given the brushes makes the old ones clean as thoroughly as do the new ones. Eighteen-centimeter brushes can thus be used advantageously until they are worn down to five centimeters, giving an average duration of 150 working hours to the brushes. Dresden saves 4,000 marks a year by thus using up the brushes. Asphalt and wood block pavements are washed. They are first swept by hand in Dresden, and then thoroughly soaked by sprinkling wagons, leaving the pavement covered with a soft mud which is scrubbed away to the curbing. The more fluid part runs into the sewers, and the remainder is collected in handcarts. In the busiest thoroughfares this cleaning operation takes place every night, except during frosty weather. Dresden is able to continue the work when the temperature is slightly below the freezing point, because she dissolves coarse salt into the water in the sprinkling wagons. An important exhibit made by one of the industrial firms was a full-sized model of a machine to take the place of the hand-workers in the scrubbing of the asphalt and wood-block pavements. It is a combination of sprinkler and cleaner. Behind the sprinkler is a rotating rubber "brush" operated by sprockets and chain, as is the brush of an ordinary street sweeping machine. This does the work of three men. Macadam, and stone block pavements when too uneven to be swept thoroughly by machine, as well as sidewalks, are swept by hand. In most cities the cleaning by hand is done less frequently—usually two or three times per week and by daylight.



THE FRANKFORT GARBAGE WAGON

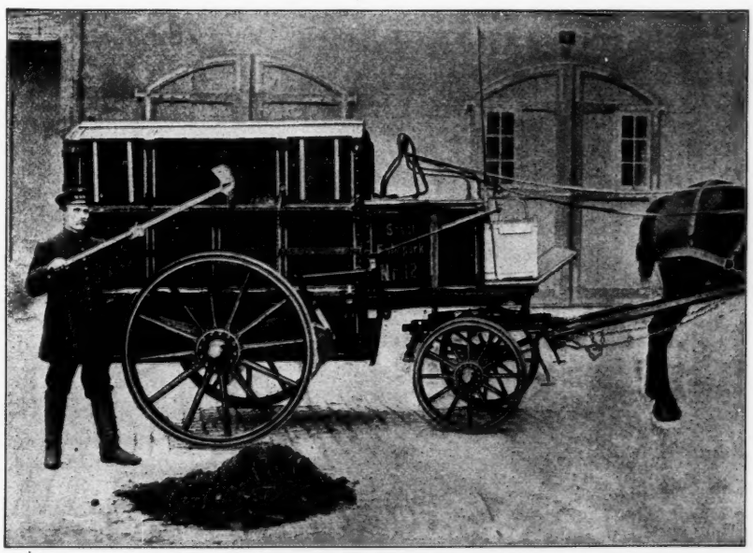
Keeping the streets clean is, rightly, considered as important as cleaning the streets. The enforcement of laws against littering the streets is, perhaps, especially rigid in Dresden, where even the shaking of a dusty cloth out of a front window is punished! The advantage of these preventive measures is, however, very noticeable; and the people are already quite in the habit of "helping to keep the city clean," so that their carefulness has ceased to inconvenience them. Moreover, it is careful, constant work of flying columns during the day which makes the streets presentable, and which makes possible the thorough, rapid cleaning at night. Permanent attendants stationed in certain streets, or flying columns, remove all refuse and manure from the pavements. During wet weather, when a thin coat of watery slime makes the pavements unsafe, they are scrubbed as after a washing. The same group of men has charge of strewing coarse sand, or fine gravel, to give horses a footing on the smooth, slippery pavements.

In Frankfort a.M. the sidewalks are cleaned by the landlords under police directions, as in most cities. The regulations require the cleaning of sidewalks twice a week, sprinkling twice a day, the removal of snow, and the strewing of some such material as sand or ashes during the icy weather. Upon request, however, the street-cleaning department undertakes this work—except the strewing of ashes—at low rates. Berlin and some other municipalities clean the sidewalks, but leave to the landlords the removal of snow and ice, and the strewing of ashes, as above. Dresden is the only municipality which embraces, as one of the regular duties of the street-cleaning department, the cleaning of sidewalks, including removal of snow and ice.

The sprinkling of the streets varies according to weather and season. On dry summer days the chief streets are sprinkled four or five times per day; all others—in Frankfort a.M., for example—at least twice a day. In the same city, asphalt streets are no longer sprinkled at all during the day, for the thorough cleansing which they receive renders sprinkling unnecessary.

The refuse and litter swept up by the street cleaners is loaded into handcarts—in Dresden, for example—and carried to collecting points, whence it is carted away by contractors. In Frankfort the collection of sweepings is made immediately by wagons from the municipal stables. In case the use of handcarts, or of a small number of dump carts, should strike one as being ludicrous, one must remember that the streets are cleaned so regularly and so frequently that no great amount of material is allowed to collect, even where the amount of traffic is great.

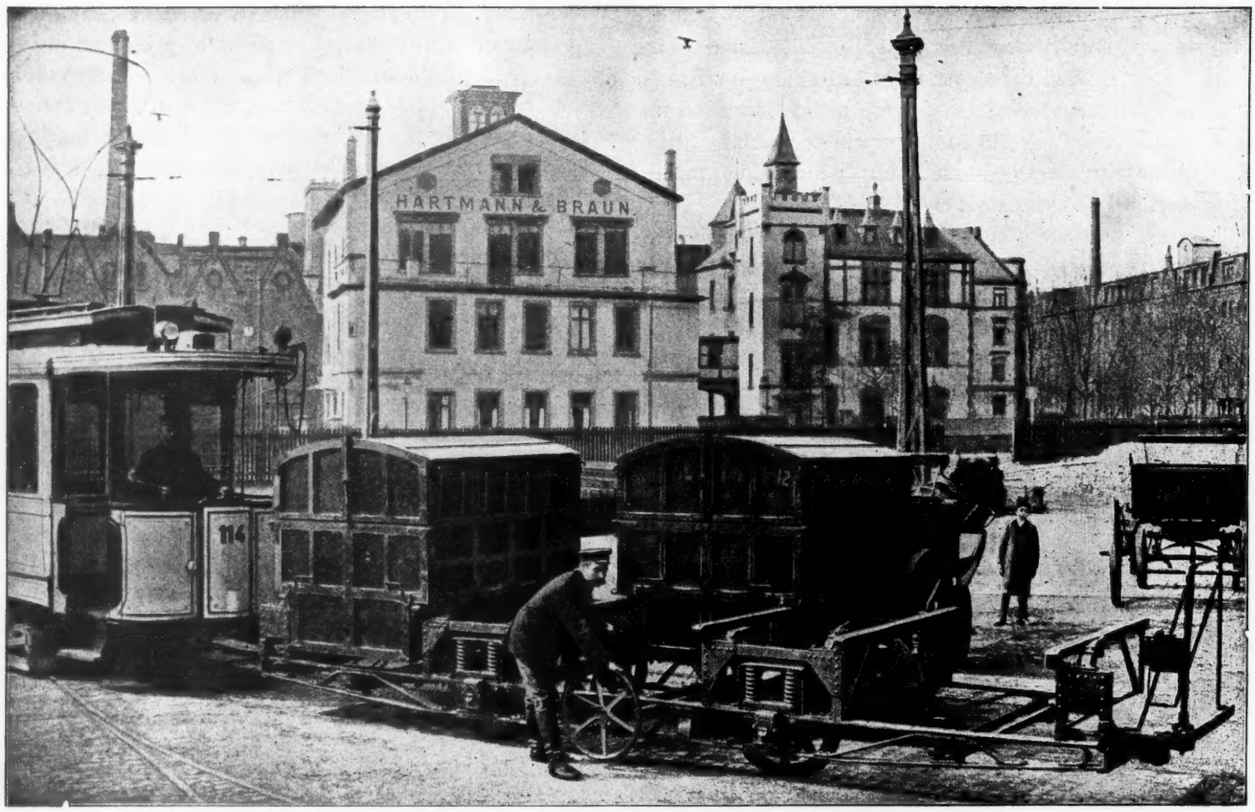
After a snowfall emergency rules, carefully worked out, go into effect. The number of districts of the street-cleaning department is immediately increased by subdivision. The working force is enlarged by the employment of extra men from other city departments, as well as men seeking work. One or two of the regular sweepers are placed in charge of each of these sub-districts to direct the extra men. The Dresden department employed as many as 2,105 extra men in a single day in 1901. Attention is first turned to the sidewalks and street crossings, then to the principal streets and the streets through which street railways run. The snow is cleared from the middle of the street and collected along the sides, whence it is loaded into wagons to be carted away. The snow thus collected is usually dumped into the river. Several cities which have swiftly flowing trunk sewers have special shafts for dumping the snow into the sewers. Transportation is thus minimized, and the work of clearing away the snow is greatly facilitated. Halle and Wiesbaden exhibited photographs of such snow falls.



COLLECTING STREET SWEEPINGS IN FRANKFORT

The collection of garbage, is still, in many cities, given over to private contractors, who are, however, bound to observe the police regulations. In Frankfort this activity is municipalized. Ashes and garbage are collected in covered wagons three times a week, between 10 P. M. and 7 A. M. The collection of the refuse from public and semi-public buildings, such as hospitals, hotels, restaurants, etc., is not included in the municipal service. The department does, however, undertake this work, as well as removal of rubbish and refuse of all sorts, at the rate of 1.85 marks per cubic meter. Full-sized models of various types of garbage wagons were exhibited. The effort to present a dust-proof wagon has produced many curiosities. Great, cumbrous, complicated, expensive machines, some of them are. Most of them were exhibited by industrial firms; but exhibits were also made by Elberfeld, Frankfort a.M., Kiel, and Coln. The Frankfort wagon is especially worthy of mention, because of the many good points which it presents. Strength, simplicity, and ease of manipulation are its chief advantages. It is adapted to have patent garbage cans used in connection with it, but can also be used for the collection of street-sweepings. The wagon box can be tipped for dumping, can be raised from the wagon bed for loading into boats, or into the receiving-room of a crematory, or can be loaded onto a special street-railway truck in order to be transported to a district dump or crematory. The entire mechanism is so simple that the driver alone can attend to the collecting and the dumping or reloading without help from a second person. This permits of the direct transportation of refuse from the house to the dump. The smaller municipalities still find it advantageous to use the refuse for fertilizer and for filling-in material. As Frankfort is, however, already finding increasing difficulty in locating dumps, she is investigating the question of cremation of garbage. Hamburg possesses the only large garbage crematory on the continent. The plant, modeled upon the English crematories, was erected in 1895 at a cost of over a half-million marks. Within six years the municipality was able to cremate 1,000 kilograms of refuse, 17 pfennigs (3½ cents) cheaper than she had formerly paid for carting away the dumps. Garbage, ashes, street-sweepings, and other refuse are all emptied into the furnace-room and gradually fed into the fire, which requires no other fuel. The large proportion of burnable material—paper, wood, partly consumed coals, etc.—makes it advisable to burn all the material without previous separation. The incombustible material, after being broken up and sorted, is used for building purposes—filling-in, road-beds, foundations, etc. Wiesbaden has just built a similar crematory, though on a smaller scale; and both Dresden and Frankfurt a.M. are contemplating the advisability of doing likewise.

A further point which may be included here is the disposal of dead animals, animals killed in the pound, animals with contagious diseases, as well as confiscated meat and fish. The bodies are cut up and reduced through steaming in kettles. The larger kettles in the Dresden establishment are for reducing animals with contagious diseases without any pre-



GERMAN METHOD OF UTILIZING STREET RAILWAY IN REMOVING GARBAGE, REFUSE AND STREET SWEEPINGS

vious preparation. The heat destroys all disease germs. The grease floats on top and is skimmed off by suction pumps and purified; the remainder is dried and ground to a powder, to be used as a fertilizer. The München establishment is located in the woods twelve miles from the city. It contains quarters for the superintendent, with stables for the horses and cattle, and separate stabling for diseased animals, and a pound for dogs and other impounded animals. The bodies are reduced to grease and fertilizers, as in Dresden.

ELECTRIC RAILWAYS IN GERMANY

Costs and Profits—Infinitely Better Than Horse-Car Lines, But Not So Lucrative to Stockholders—German Cities Exacting with Tramway Companies

*By Frank H. Mason**

THE enforced publication of corporate finances and the exhaustive methods by which municipal accounts are kept and made public in Germany have enabled the Association of Electrical Engineers to collect and formulate some highly interesting statistics on the financial results which have followed the change from horse to electrical traction in street railways in this country. Although this transformation began later here than in Belgium and the United States, it was made with such promptness and energy that within a period of four or five years the horse car practically disappeared from Germany and was replaced by electrical tramway systems, which traverse all the cities and larger towns and connect each of them with practically every village and hamlet in a large and constantly extending radius.

These systems have now been in operation long enough to supply some definite data as to the profits of such enterprises under existing conditions in Germany, which, measured by average street railway dividends and the market values of their shares, have been in general somewhat disappointing. The net fact, which has been known to investors for some time, and which these newly formulated statistics confirm and explain, is that electric street-car lines, while serving the public infinitely better than any other method of city and suburban transportation yet devised, have proved in many if not most cases less lucrative to shareholders than the horse-car lines which they replaced.

REASONS FOR INCREASED EXPENSE

There are several tangible reasons for this, some of which are more or less peculiar to Germany. Among these may be cited the fact that most German municipalities refused at the outset to permit overhead conductors to be used in important or centrally located streets, and the companies were therefore forced to use a costly type of car which would take its current in the suburban streets from an overhead wire carrying a voltage sufficient to charge at the same time storage bat-

*Consul-General, Berlin, Germany. From the Consular Reports.

teries of sufficient capacity to run the car through the central districts where the trolley wire was forbidden. These storage batteries were heavy and expensive, they deteriorated steadily and were difficult to keep in order, and when the snow and ice of winter encumbered the tracks they failed so utterly in Berlin, Hanover, and other cities that thousands of cars equipped with them had to be thrown out and their storage batteries removed. It was only at this heavy cost that the overhead trolley wire secured admission to the central districts of several German cities, and there are even yet in Berlin and elsewhere long stretches on important avenues where it is tabooed and underground conductors are insisted upon as indispensable.

A second important fact in this connection is that German municipalities are very exacting with tramway companies in respect to rates of fare, paving, and all the other specifications of their franchises. Every step in the process of construction is subject to the inspection and control of the city engineers. Most franchises involve the responsibility of the company of laying and keeping in repair the pavement on all space between the two outer rails, a breadth, in case of double tracks, of twelve to fifteen feet or more, and where, as in Berlin, the pavement is asphalt laid on deep foundations of rubble and cement, this becomes a heavy item in the cost of construction and maintenance, for no skill and experience seem able to avert the necessity of frequent upheavals for purposes of repair, in which asphalt and cement have to be cut out with cold chisels driven by sledges, a slow and toilsome operation.

Large Fuel and Maintenances Charges

Moreover, there are very few municipalities in Germany where electric current can be generated by any other or cheaper power than that of steam or gas engines, and no form of steam fuel is really cheap in this country. Although a very few of the largest central stations produce electric power as low as 1¼ cents per kilowatt-hour, in most others the cost averages from 2¼ to 3¾ cents, and in certain small stations as high as 10 cents per kilowatt-hour. Estimated by the ordinary German standard, the power consumption per car varies with grade, curves, and other conditions from 450 to 700 watt-hours per car-kilometer, equal (in case of the latter figure) to 1,170 watt-hours per car-mile.

Finally, the outlay for track renewal and repair turns out here, as elsewhere, to be unexpectedly heavy. In the days of horse cars a well-laid track in a city of from 150,000 to 200,000 inhabitants would last from a dozen to fifteen years. Now, with the far heavier and more frequent cars, the rails, especially at curves, wear in much less than half that period until the wheel flanges are found running on the bottom of the groove, so that the track has to be taken up and renewed. Another cause of frequent and expensive repairs lay in the fact that the surface resistance of the copper bonds with which the rail ends were united increased rapidly under certain conditions, until their use was largely superseded by the better system of welding the rail joints by means of electrical heat or thermite.

Still another increased item of expense has been that of labor. The motormen are naturally employees of a higher grade than horse-car drivers, and being well organized, they have been able to compel increased wages and to shorten working hours until the net labor cost per car-kilometer is more than 50 per cent. greater than in former years.

Taxes Much Lower Than in the United States.

To all this is to be added the fact that the rates of fare in most if not all German cities are rigidly restricted by the authority granting the concession. In Berlin, for instance, street railway fares anywhere within city limits are restricted to 2.38 cents, and for the same sum the passenger may ride on some of the suburban lines any distance up to 4.34 miles. From the latest published statistics it appears that the average street railway fares paid in 11 principal German cities during the year 1903 varied from 2.2 cents each at Frankfort to 2.72 cents at Hamburg, the mean average for Berlin and its suburbs being 2.35 cents, or less than half the usual 5-cent fare that prevails generally in the United States. To complete the restrictions under which street railways operate in this country, most of their charters contain clauses providing that from a prescribed date the company shall pay to the municipality a portion of its surplus after disbursing a stipulated percentage as dividends. A typical contract of this kind stipulates that beginning with 1903 the company shall pay to the city 35 per cent. of its surplus remaining after a 6¼ per cent. dividend has been paid to stockholders, and 50 per cent. of the surplus after an 8 per cent. dividend. Many charters further provide that after being operated by the companies for a specified term of years the whole installation, tracks, power plant, and equipment, shall revert in fee simple to the municipality which has granted to the corporation for a term of years the use of its streets.

The total length of German street railways at the close of 1902 was 1,906 miles, of which 346 miles, or about 18 per cent., were under municipal ownership. Of the latter, sixty-five miles were leased to individuals, leaving 281 miles of lines operated directly by the municipalities. The four longest municipal lines are at Frankfort, twenty-six and one-half miles; Düsseldorf, twenty-five miles; Munich, twenty-nine miles, and Cologne, forty miles. It does not appear that fares over these lines are lower, but, on the contrary, that they are rather higher than those charged on similar lines worked by individuals or corporations. In Nuremberg, for example, the principal street railway charged, under private management, a uniform 2.38-cent rate, until the city, in order to complete a zone system, took over the private line and thereupon increased the rate of fare. On the whole, it can not be said that experience has increased public sentiment in Germany in favor of municipal management of street railways, and several cities—among which is Barmen—which built their own lines, are now considering the plan of leasing them to private companies.

Private vs. Municipal Ownership

By far the largest and most important corporation of this kind in Germany is the Great Berlin Street Railway Company, which, with its various branches, operates 200 miles of track, of which 144 miles are owned and the remainder are controlled by the company. On its own lines the "Grosse Berliner" ran last year 40,400,000 car-miles and carried 295,000,000 passengers, whose fares aggregated $7,025,000. The total capital of the company is 100,082,400 marks ($23,819,611); its shares are to-day worth 184, and its 3½ per

cent. bonds are quoted at 99.40. This, however, is the status of an exceptionally powerful and ably managed company in a large, level city, and is quite above the average financial condition of street railway companies elsewhere in Germany, most of which have to be satisfied with 4 and 5 per cent. net earnings on their stock.

The Berlin company is at present in litigation with the city over a question which, as it involves the important point whether a municipality may grant franchises to new companies on streets already occupied by another lessee, has a certain pertinent interest in this connection. About two years ago there was opened for traffic the so-called Elevated and Underground Railway, a double-track electric line of the most perfect construction and appointment, with two arms or branches running from a central station to points in the eastern and western parts of the city. Trains of three cars run over these branches at intervals of three to five minutes and at such speed as to traverse a distance of 2½ miles in about ten minutes. The line is very popular and carries an immense and steadily growing traffic, which naturally trenches more or less upon the business of the surface lines which belong to the "Grosse Berliner." In order to reach a still more central and crowded portion of the city the new company asks authority to extend its subterranean main system from the present terminus at the Potsdamer Railway station northeastward to a point beyond the river. To this the Great Berlin Company objects, and the municipality has applied to the courts to confirm its authority to disregard the protest and grant the franchise for what would be an important public improvement.

Phenomenal Increase in Business

The one all-controlling fact which has enabled street railways in Berlin and other German cities to make head against the exacting requirements of municipalities and the enormous cost of conversion from horse to electric traction, with the increased outlay for labor, workmen's insurance, paving, and other expenditures, has been the phenomenal increase in business, particularly in the suburban traffic in all the larger towns, which has come with the increased speed, the greater frequency of service, the better ventilation, space, and comfort of electric cars. Whole suburbs have been built up within a few years by the influence of a single well-managed tramway line, which carries a legion of men and women to and from their daily toil in the city more quickly and cheaply than the horse car could transport them half the same distance. And although the electric street railways of Germany under the conditions above described are but moderately remunerative to shareholders, they hold a high place among the potent influences of modern civilization.

PORTLAND CEMENT*

Its Uses in Various Engineering Constructions—Heat Developed in the Setting and Hardening of Cement, Mortars and Concrete

By E. Kuichling, C. E.†

In the previous numbers of the Municipal Journal and Engineer, the subject of the chemical constitution of Portland cement has been considered, along with the physical characteristics of its principal constituents. This may now be followed by an account of the phenomena which occur when the cement is mixed with water, sand, etc., to form mortar and concrete.

Evolution of Heat on Hydration

As is well known, a hydraulic cement has the property of hardening in a comparatively short time after being moistened with water, and in this process a rise of temperature is generally observed. This evolution of heat was noticed to be greater in quick-setting cements than in slow-setting ones, and in former years it was thought that the observation of the rise in temperature during the setting process would furnish a reliable means of estimating the quality of the material and its fitness for practical use. In some old specifications for Portland cement we find the statement that the material would be rejected if the temperature of the briquette rose on hydration more than a certain number of degrees, the limits prescribed being from 10° to 40° F.; but as it was subsequently established that such a test was uncertain, the fixing of a limiting rise of temperature has latterly been omitted.

To indicate the views that were entertained some years ago by engineers on this subject, a few references may be of interest.

In a paper on hydraulic cements by Alfred E. Hunt, C. E., of Pittsburg, Pa., printed in 1891, it is stated that "the mixing with water should be done rapidly and the temperature of the mass taken with a thermometer. With cements of good quality the increase of temperature should not be over 10° F. for slow-setting natural cements, while an increase of 40° to 50° F. is sometimes noted with good brands of quick-setting and sound Portland cement."

In the book entitled "Portland Cement for Users," London, 1881, the late Henry Faija, C. E., who was one of the foremost English authorities on cement, says: "It is needless to say that the time taken by a sample to set and the heat developed will materially assist in determining its nature"; and in a paper on the testing of cement, read in 1884 before the Institution of Civil Engineers (vol. 75, p. 220-221), he expresses himself as follows: "A slow-setting cement does not practically increase in temperature during setting; it is only the quick-setting ones that develop this characteristic. Many quick-setting cements when fresh will increase in temperature as much as 16° and 18° F. in 8 or 10 minutes from gauging, and will not return to their normal temperature for more than an hour. If cement possessing this characteristic be cooled, it will be slower-setting, and the increase in temperature during setting will not be so

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† Engineering Editor, Municipal Journal and Engineer.

great. This test may therefore be often useful in assisting in the immediate determination of the value of a cement."

In his book on "Hydraulic Cement," New York, 1897, (pp. 65 and 77), Prof. F. P. Spalding states that "quick-setting cements usually show a rise in temperature during setting, due to the rapidity of the action which takes place. It has been suggested that this be used in connection with the time of setting. Most slow-setting cements, however, do not show any appreciable rise in temperature. * * * Aluminates of lime give off heat on adding water." Prof. C. D. Jameson, in his book on "Portland Cement," New York, 1898 (p. 57), states that "in mixing mortar for briquettes, any increase of temperature should be carefully noted, as it indicates the presence of free lime. In the best Portland cement, such increase of temperature on adding water is very slight, but in some cases it is very perceptible to the hand. With light-burned natural cements the rise in temperature is very marked. To a certain extent it is proportional to the quantity of free lime, and various attempts have been made to use this fact as a test for the actual percentage of free lime in the sample, but the method is not practical, as it involves too much delicacy of manipulation in the laboratory."

In *Thonindustrie Zeitung* for March 20, 1903, Dr. W. Michaelis, of Berlin, states that the calcic aluminates ($4CaO, Al_2O_3$ to $2CaO, Al_2O_3$) develop an enormous quantity of heat in hydration, and hence that a rise in the temperature of freshly wetted cement cannot be attributed to the presence of free lime alone. In his work on hydraulic mortars, he showed that the Portland cements which are richest in lime exhibit the least rise in temperature on hydration, while those which contain much clay or alumina develop much heat. Certain Portland cements containing from 9 to 10 per cent. of alumina have been observed evolving heat enough to cause a perceptible emission of steam.

In the German work on Portland cement by Büsing and Schumann, Berlin, 1899, p. 15, it is stated that "in the process of the setting of cement there is always some rise of temperature. In quick-setting cements this rise may be more than 10° C. (18° F.), and it becomes greater in proportion to the quantity of material prepared. In 1882 Herzog found that in molding two sets of cubes of mortar, one having edges 4 inches long and the other 8 inches long, the rises in temperature were respectively 16° and 32° C. In 1896 Dyckerhoff reported that in molding 8-inch cubes of rich mortar, consisting of one part of cement to one of sand, the rise in temperature was from 20° to 23° C.; for similar cubes of rich concrete, consisting of one part of cement, one of sand and one of broken stone, the rise was 17.5° C.; while for a meager concrete, consisting of one part of cement, three parts of sand and six parts of broken stone, the rise was only 3° C.; also that in the case of pats of neat cement, the rise at the completion of setting was only 1.5° C."

In his book on "Portland Cement," London, 1899 (p. 227 et seq.), D. B. Butler states that "the setting of cement is a process of crystallization in which it evolves more or less heat, depending on the intensity of the action or the time required for its completion. Faija and other experts formerly deemed it important to note the rise of temperature during the setting of a cement, as it was thought to give a good indication of its properties. This was done by placing a thermometer coated with grease or paraffin in the pat immediately after mixing with water and moulding, and observing the rise of temperature, care being taken to have both the cement and the water at the same temperature as the air in the room. As the setting proceeded, the temperature was found to rise until a maximum was reached, after which it gradually fell to its original figure. The time which elapsed between the addition of the water and the attainment of the maximum temperature varied greatly in different cements, and depended on both the fineness of the grinding and the composition of the cement; and the time required for the pat to return to its initial temperature was considered to be that which was necessary for the setting to become completed. Subsequently this test was abandoned, as it was found that the data thus acquired were of little service in estimating the value of the material for practical purposes."

In his paper on the Vyrnwy Dam of the Liverpool Water Works, read before the Institution of Civil Engineers in 1892 (vol. 126, p. 46), Mr. Geo. F. Deacon advocates the use of the test to detect free lime, stating that "it was required that the cement as delivered should be slow-setting. In the earliest stages of the work the condition of such cement, as regards the presence of free or loosely combined lime, was determined by the old method of making thin pats and observing the degree of tendency to crack after many days, but this was subsequently abandoned for a perfectly simple and exhaustive test which could be made in a few minutes, and which the author has adopted ever since. A sample of cement, a vessel of water, a small glass jar and a thermometer are left together for a time to acquire a uniform temperature. The cement is then mixed as quickly as possible in the jar with enough water to render it plastic, and the thermometer being immediately pressed into it, the initial temperature is recorded. If within 15 minutes the rise of the thermometer exceeds 2° F., or within 60 minutes 3° F., the cement is further exposed before use. No bin of cement was certified for use on the works until it had passed one of these tests. This precaution, combined possibly with the comparatively dry method of manipulation, is so effective that where it has been adopted the author has never seen a hair-crack of the kind so familiar where fresh cement is used."

Butler's Experiments

In the discussion of Deacon's paper, Butler challenged the utility of this temperature test, and maintained that the rise during setting was rather due to the chemical action of crystallization than to the presence of free lime. To illustrate this point, he made experiments with eight different kinds of Portland cement, of which one was a specially prepared "overlimed" material, while most of them were sound when subjected in pats to Faija's test of moist heat at 100-105° F., and hot water at 115-120° F. These cements were of different grades of fineness as received from the manufacturers, and in order to ascertain the effect of still finer pulverization on the setting and rise of temperature, a part

of each sample was reground to pass a sieve having 180 meshes per lineal inch. The results of these experiments are given in the following table:

Cement No.	Condition of cement as to grinding.	Residue percentage left on sieves of meshes per lin. in. 180	76	50	Time of setting in minutes Initial Set.	Hard Set.	Increase of temperature during setting, and time. F.°	Time to return to initial Temp., Min.	Pat tested by Faija's Method.
J	Original	22.4	6.0	0.0	25	45	22	40	120 Sound
"	Reground	Trace	0.0	0.0	1	5	38	5	90 "
K	Original	26.6	10.0	2.7	30	90	17	100	240 "
"	Reground	Trace	0.0	0.0	6	15	32	11	150 "
L	Original	24.4	7.6	1.5	30	120	9	60	180 Blown
"	Reground	Trace	0.0	0.0	7	15	29	13	120 Sound
M	Original	30.0	6.7	1.2	20	60	21	34	150 "
"	Reground	Trace	0.0	0.0	2	10	26	8	75 "
N	Original	28.4	9.3	1.0	15	30	25	21	120 "
"	Reground	0.6	0.0	0.0	1	10	32	4	120 "
O	Original	26.4	7.7	0.5	Indef. †	360	2	39	160 "
"	Reground	0.4	0.0	0.0	8	25	27	12	95 "
P*	Original	18.0	3.0	0.8	15	240	15	23	120 Blown badly
"	Reground	0.4	0.0	0.0	2	240	23	5	100 " slight
"	Original, and mixed with 2% gypsum	18.0	3.0	0.8	Indef.	1440	1	15	35 Blown
Q	Original	34.8	16.0	3.6	20	30	17	35	180 Blown badly
"	Reground	1.6	0.0	0.0	2	5	26	5	180 Sound
"	Original, and mixed with 2% gypsum	34.8	16.0	3.6	Indef.	1440	1	15	30 Blown

NOTE.—* A specially prepared "overlimed" cement. † Indefinable.

Referring to the foregoing table, Butler states that "in each case the heat evolved bears a marked relation to the setting properties of the sample. As a general rule it was found that the thermometer was practically stationary until the period of initial set was reached, and then it commenced to rise rapidly. In some cases the activity of the crystallization was so intense that the temperature ran up 30° or 40° in 5 or 10 minutes, and the heat generated caused some of the moisture to be given off in the form of vapor, which could be plainly seen rising from the pats. It will also be noticed that cements (P) and (Q) in their original coarsely-ground condition are unsound and show a comparatively moderate increase in temperature; and that on being finely ground, they become sound, but also much quicker setting, and evolve much greater heat. Cement (L) also gives similar results."

"To ascertain conclusively whether the presence of free lime, or the action of crystallization, was responsible for the rise in temperature during setting, cements (P) and (Q) in their coarsely-ground condition were mixed with 2 per cent. of gypsum, which, as is well known, retards the setting of cement. The result was that they were thus rendered extremely slow-setting, and practically evolved no heat whatever; and yet they were still unsound and developed decided indications of blowing in the Faija apparatus."

"These results not only show that a cement which develops a considerable increase in temperature may be perfectly sound, but, what is more to the point, a cement may be extremely slow-setting and therefore show no rise of temperature whatever, and yet be absolutely unsound and unfit for use. Such a test, therefore, while it certainly ensures an extremely slow-setting cement, which in view of the special method of manipulation adopted by Mr. Deacon was absolutely imperative, in no way guards against an unsound one, and moreover imposes needless and irritating restrictions upon the manufacturer. * * * Such a test (as that described by Mr. Deacon) is tantamount to asking for a cement containing admixtures of gypsum or similar material, to artificially render it slow-setting."

GARY'S EXPERIMENTS

Experiments similar to those of Butler were also made by Prof. Max Gary in the testing laboratory of the Prussian Government at Berlin, in connection with accelerated tests for soundness of cement, and a report thereof is given in *Thonindustrie Zeitung* for 1898, p. 292. Thirteen different brands of Portland cement were used, and during the investigations the temperature of the air ranged from 14.8° to 20.4° C., while that of the water ranged from 13° to 19° C. All of the samples stood the usual tests for soundness, but failed on applying the special drying, igniting and boiling tests. The results are given in the following table:

Cement No.	Specific gravity.	Per cent. water used in mixing.	Time of setting in minutes. Initial set.	Hard set.	Increase of temperature during setting. F.°	Tensile strength in lbs. per sq. in. after 7 days.	28 days.	Rate of setting.
12.....	3.077	25.8	41	381	3.2	179	228	Slow
19.....	3.105	30.6	195	450	6.3	...	214	"
39.....	3.094	31.0	30	110	5.4	66	120	Rel. quick
60.....	3.003	26.2	12	22	7.7	178	246	Quick
64.....	3.089	31.0	495	660	1.8	141	209	Very slow
69.....	2.983	26.8	150	480	2.7	165	184	Slow
74.....	3.122	25.8	495	675	2.7	184	262	Very slow
82.....	3.079	26.3	250	435	3.8	216	292	Slow
103.....	3.062	26.0	120	210	5.4	...	208	"
109.....	3.046	26.0	18	23	23.4	129	231	Quick
112.....	3.104	27.1	120	420	5.6	204	293	Slow
113.....	3.099	25.2	3	12	11.2	165	253	Very quick
115.....	3.101	26.4	60	480	5.9	283	356	Slow

WATERTOWN ARSENAL EXPERIMENTS

A very interesting series of experiments with a variety of cements was made during the year 1901 at the Watertown Arsenal, Mass., in order to gain a clearer view of their properties, and among them is the determination of the temperature acquired during setting. A chemical analysis of each cement was first made, after which the samples were subjected to a number of different tests. The observations of temperature were made upon 12-inch cubes, mixed with water and set in plank molds, with upper surfaces exposed to the air. The rise of temperature was observed by means of a stem-graduated thermometer resting in a small, thin, copper tube embedded in the cement and reaching to the center of the cube. A small quantity of oil was used in the bottom of the tube to aid in conducting the heat promptly to the thermometer.

In experiments of this kind the temperature attained depends upon the quantity of material used. Small cubes show slight changes in temperature, but the change increases with the size of the cube. Twelve-inch cubes were adopted as a convenient practical limit in these tests. The highest temperatures were reached by the Portland cements as a class, in some cases exceeding the boiling point of water. A number of hours elapsed before the maximum was attained. With neat Portland cement, it was generally from 6 to 12 hours, while in the case of mortar consisting of 1 part of cement to 1 of sand, about 18 hours were required. In the latter the maximum temperature was only 52° C. It was also found that both the maximum temperature and

the time of reaching it are modified by the use of different quantities of water in the mixing.

Cement held in the mixing bed for different periods of time and then put into the molds, shows an increase in temperature, but in less degree. The observations were plotted in the form of diagrams, which show that the temperature curves of such batches, whether kept at rest or in a state of agitation in the mixing bed, remained below the temperature curve of the same material which was immediately put into the mold.

The natural cements attained their maximum temperature early, and this maximum is much below that reached by the Portland cements. The curves which attain the highest temperatures also exhibit the sharpest crests. The observations extended over a period of nearly 40 hours, at the end of which time the Portland cements still remained above the temperature of the air in the room, whereas the natural cements had then nearly or quite returned to that temperature. The mixing was done when the temperature of the room ranged from 22° to 24° C., but owing to the rapid heating of some cements, much higher temperatures were reached by the cubes before the material could be tamped into the molds and the initial reading of the thermometer taken. Mixing with hot water promoted the prompt attainment of higher temperatures. The same brand of cement with and without plaster of Paris in its composition showed different temperature curves, the usual composition with plaster reaching the higher temperature.

The principal results of these experiments are given in the following two tables, of which the first gives the chemical analyses, while the second relates to the maximum temperatures attained and a few other details. The temperature curves of the Portland cements generally exhibit a moderate rise in the outset, followed by a rapid increase to near the maximum, and then a gradually diminishing rate until the maximum is reached, after which the temperature falls nearly uniformly to the initial magnitude. For the natural cements, the curves rise quickly from the outset.

CHEMICAL ANALYSES OF CEMENTS EXAMINED AT WATERTOWN ARSENAL, MASS., 1901.

Brand.	Class.	SiO_2	CaO	Al_2O_3	Fe_2O_3	MgO	SO_3	CO_2
Alpha	Portland	20.60	59.00	11.20	2.91	3.25	1.40	1.34
Atlas	"	18.32	60.00	11.22	3.36	3.78	1.40	1.92
Krause	"	20.76	62.00	6.68	1.76	4.63	1.21	2.86
Lehigh	"	23.84	61.58	8.12	1.30	2.48	1.60	1.08
Star*	"	22.00	57.00	9.67	2.76	3.42	2.07	2.63
Star†	"	22.00	59.90	9.00	2.50	3.50	1.98	0.75
Star‡	"	22.45	60.27	9.27	2.53	3.59	0.60	1.00
Storm King	"	22.94	43.74	6.30	2.90	20.72	2.83	1.00
Whitehall	"	20.30	62.15	10.87	2.95	2.51	1.10	0.12
Alsen	"	20.42	57.50	11.00	2.10	2.53	2.26	4.19
Dyckerhoff	"	20.04	63.02	7.48	3.95	1.23	1.62	3.00
Germania	"	22.54	62.36	7.92	2.68	1.15	...	3.35
Josson	"	22.92	63.39	7.98	2.46	Trace	1.28	1.97
Steel	Slag	30.98	43.00	14.82	Trace	4.16	3.44	3.60
Cathedral	Port. Composite	57.76	34.13	3.60	0.98	1.04	1.00	1.49
Silica	" "	23.10	41.77	4.74	0.92	9.85	0.66	19.00
Akron Star	Natural	20.40	40.64	6.22	2.56	25.80	2.91	1.47
Austin	"	19.02	41.18	8.96	1.24	26.58	1.27	1.75
Bonneville Imprv.	"	30.40	52.12	10.36	2.60	0.21	1.24	3.07
Hoffman	"	25.00	39.30	8.93	2.27	16.18	1.40	2.66
Mankato	"	27.70	37.00	7.06	1.86	22.63	1.23	2.46
Newark Rosend...	"	28.71	27.00	5.88	3.60	30.00	1.30	3.52
Norton	"	26.66	38.33	11.48	3.02	16.41	1.35	2.75
Obelisk	"	23.70	37.00	16.70	3.30	15.30	1.98	2.00
Potomac	"	32.00	33.89	8.79	2.70	18.10	1.31	3.20

NOTES.—* Earlier manufacture. † With plaster. ‡ Without plaster.

MAXIMUM TEMPERATURES ATTAINED BY 12-INCH CUBES OF CEMENTS WHILE SETTING. WATERTOWN ARSENAL, MASS., 1901.

Brand.	Class.	Composition. Cement.	Composition. Sand.	Per cent. of water.	Max. temp. C.°	Time to attain max. temp., hrs.	Agitated before molding, hrs.	Rested before molding, hrs.	Age after grinding, days.
Alpha	Portland	Neat	..	26.2	95.0	11.0	0	0	..
"	"	"	..	22.5	102.0	9.4	0	0	..
"	"	"	..	26.2	102.5	9.8	0	0	..
"	"	"	..	35.0	96.0	12.0	0	0	..
"	"	"	..	30.0	99.0	10.6	0	0	..
"	"	"	..	26.2	100.0	11.2	**	2	..
"	"	"	..	29.6	§105.0	6.6	0	0	..
"	"	1	1	32.3	§52.0	0.7	0	0	..
"	"	1	1	32.3	52.0	17.0	0	0	..
"	"	1	2	46.2	36.0	12.0	0	0	..
"	"	1	3	56.1	31.0	11.0	0	0	..
"	"	1	4	77.8	29.0	10.4	0	0	..
Atlas	"	Neat	..	23.6	73.0	9.3	2	..	..
"	"	"	..	26.0	69.0	10.3	5	..	..
"	"	"	..	29.0	58.5	12.3	8	..	..
"	"	"	..	22.7	81.5	7.6	0	0	..
"	"	"	..	24.8	72.0	9.6	..	2	..
"	"	"	..	32.0	68.5	10.3	..	5	..
"	"	"	..	38.8	57.0	12.3	..	8	..
Lehigh	"	"	..	25.9	79.0	16.0	0	0	..
Star*	"	"	..	26.5	76.0	6.4	0	0	..
Star†	"	"	..	33.4	99.5	7.6	0	0	40
Star‡	"	"	..	35.7	88.5	10.0	0	0	40
Storm King	"	"	..	27.0	42.5	6.4	0	0	..
" "	"	"	..	23.1	§48.0	7.3	0	0	..
Whitehall	"	"	..	25.2	103.5	6.6	0	0	20
Alsen	"	"	..	29.4	75.0	7.6	0	0	..
"	"	"	..	36.5	¶61.0	10.4	0	0	..
"	"	"	..	42.2	§79.0	5.7	0	0	..
Dyckerhoff	"	"	..	25.0	63.0	11.0	0	0	..
"	"	"	..	27.5	60.5	13.0	0	0	..
Josson	"	"	..	29.7	51.0	13.0	0	0	..
Steel	Slag	"	..	35.6	32.0	13.6	0	0	..
"	"	"	..	32.9	§55.5	2.7	0	0	..
Silica	Port. Composite	"	..	25.6	35.0	22.2	0	0	..
Austin	Natural	"	..	40.0	35.0	2.0	0	0	..
Bonneville Imprv.	"	"	..	37.6	39.5	9.5	0	0	..
" "	"	"	..	47.2	§54.5	0.6	0	0	..
Hoffman	"	"	..	36.5	34.0	1.6	0	0	..
Mankato	"	"	..	44.6	40.0	1.0	0	0	..
"	"	"	..	46.2	§53.0	0.9	0	0	..
Newark Rosend.	"	"	..	35.5	40.0	1.6	0	0	14
Norton	"	"	..	41.8	39.0	2.0	0	0	..
"	"	"	..	43.8	§55.0	0.6	0	0	..
Obelisk	"	"	..	35.0	37.5	1.8	0	0	..
Potomac	"	"	..	41.5	28.5	2.4	0	0	..

NOTES.—* Earlier manufacture. † With plaster. ‡ Without plaster. § Mixed with hot water. ¶ Ground finer than 0.0058". ** Retarded 2 hours, manner not stated.

OTHER OBSERVATIONS

That a large quantity of heat is evolved by masses of concrete soon after being placed is clearly shown by the following instance cited on p. 32 of the Report of the Boston Transit Commission for 1901, by Howard A. Carson, chief engineer. The temperature of the air in the East Boston Tunnel was considerably increased by the chemical action involved in the setting and hardening of the concrete. In one experiment a rise of temperature of 40° F. above that of the air in the tunnel was noted in the middle of a wall two days after the concrete had set. About 12 days after setting, the temperature receded to that of the air. The concrete was made of 123 lbs. dry Portland cement, 2.5 cu. ft. sand and fine crushed stone, and 4.0 cu. ft. of coarse crushed stone.

A series of highly interesting and valuable observations on the temperatures which develop in the interior of large masses of masonry has also been made recently by Messrs. J. Waldo Smith and Wm. B. Fuller, engineers of the new cyclopean concrete dam at Boonton, N. J. At one locality

in this structure where the thickness is 45 ft., five thermophones were permanently bedded on May 22, 1903, in the masonry at intervals of 10 ft., the first and last instruments of this series being about 2.5 ft. from the two exposed faces. The mean daily temperature at the time named was about 60° F. Soon afterward the masonry was continued upward, and the observations of temperature were then begun. On June 8, 1903, the instruments indicated temperatures ranging from 78° F. near the two faces, to 85° F. in the interior. These temperatures remained unchanged for respectively 3, 5 and 10 days, whereupon they slowly diminished. The lowest temperatures were reached on Feb. 21, 1904, after a long period of unusually cold weather, the record showing 30° to 35° near the two faces and 53° F. in the interior. It was also observed that the temperatures varied slightly with the mean daily temperatures of the air during each month.

In the foregoing, reference has been made only to the maximum temperatures which certain masses of cement, mortar and concrete acquire in the process of setting and hardening. From the citations given it will be seen that the rise in temperature varies so widely with the quality of the cement, the composition of the mortar or concrete and the bulk of the sample under observation, that little practical use can be made of the data. To formulate a valid relation between the maximum temperature of hydration and the strength or fitness of the cement, many more experiments will be required with different quantities of material, and notes of the progressive changes of temperature, as well as of the volumes of water, sand and ballast, and the chemical composition, strength and soundness of the cement, should be available.

Quantity of Heat Evolved During Hydration

Another interesting phase of the subject which has recently received attention from investigators is the determination of the quantity of heat that is evolved by cement in the process of hydration. This is an entirely different matter from the observation of the maximum temperature attained by the material, as the work involves the exercise of the utmost care to prevent any loss of heat by radiation, etc., during the reaction, and hence also great niceties of manipulation which can be carried out only in a well-equipped laboratory. To indicate what has been done in this direction and the methods employed, the following paragraphs have been compiled from a variety of sources.

Chemical action involves a re-arrangement of matter, and is manifested by one or more of the different forms of energy, such as heat, light and electricity. Heat and chemical action are closely and definitely related, as every chemical change is attended by the liberation or absorption of heat, the quantity of which can often be measured. The unit of such measurement in thermo-chemical computations is the calorie, which is the quantity of heat required to raise the temperature of one kilogram of pure water from 0° to 1° C., or from 4° to 5° C. In English and American steam engineering practice, however, the British thermal unit (B. T. U.) is commonly adopted, this being the quantity of heat required to raise the temperature of one pound of pure water from 39.1° to 40.1° F. As one kilogram is equal to 2.2046 pounds and one degree C. is equal to 1.8° F., it follows that one calorie is equal to 3.968 British thermal units.

Furthermore, it is obvious that the quantity of heat liberated or absorbed during a reaction must be proportional to the quantity of the combining substances, or to that of one of them, as the quantity of the other substance is fixed by the nature of the product. In the case of the hydration of oxides and salts, the quantity of heat is usually given in calories with reference to the "gram-atomic weight" of water, or, in other words, to that specific quantity of water whose weight in grams is the number which represent the atomic weight of water. As water consists chemically of H_2O, and the atomic weight of H is 1.0, while that of O is 16.0, it follows that the atomic weight of H_2O is 18; hence in thermo-chemical tables the given number of calories liberated in hydration relates to each unit of 18 grams of water entering into chemical combination with the corresponding gram-atomic weight of the particular oxide or salt under consideration.

To illustrate this matter by an example, reference may be made to the quantity of heat evolved in the slaking of lime. According to Thomsen (Thermochemische Untersuchungen, 1882, vol. 3), 15.54 calories are liberated when 18 grams of water (H_2O) combine with 56 grams of calcium oxide (CaO) to form 74 grams of calcium hydroxide (CaO, H_2O); or expressed in more familiar terms, the combination of 1.00 lb. of water with 3.11 lbs. of quick-lime sets free heat enough to raise the temperature of 1.0 kilogram of water 391.5° C., or 1.0 lb. of water 1,553.6° F., or of 8.63 lbs. of water from the freezing point to the boiling point.

The heat produced in a process of hydration wherein a solid hydrate is formed, is due in part to the solidification of the water and in part to the chemical action. Its quantity varies with different oxides and salts in a manner which is not yet understood, so that the process is evidently very complicated in its nature. Unfortunately, exact investigations of this character in regard to limes and cements have hitherto been very limited in scope, and hence but few more data can now be added. Thomsen gives for the heat of hydration of calcium sulphate producing $CaSO_4$, $2H_2O$, 4.74 calories for the two equivalents of water; magnesium sulphate producing $MgSO_4$, H_2O, 6.98 calories; magnesium oxide producing MgO, H_2O, 3.00 calories, and ferric oxide producing Fe_2O_3, $3H_2O$, 54.59 calories for the three equivalents of water. For calcic silicates and aluminates separately no exact data seem to be available.

Determinations of the quantity of heat developed during the setting of Portland cement have been made by Dr. Tomëi, of Finkenwalde, and Dr. Kosmann, of Berlin, and are given in *Thonindustrie Ueitung* for 1895, p. 568 and p. 597. The former states that 1 kilogram of quick-lime will evolve in slaking 277 calories (1,099.14 B. T. U.), and that the same quantity of well-burned gypsum, or plaster of Paris will develop in setting 39 calories (154.75 B. T. U.). In dealing with Portland cement, 20 grams of the powder are usually mixed quickly with 32 per cent. water in a tin vessel placed in a calorimeter. The material generally ab-

sorbs in hydration about 24 per cent. of water, thus leaving a small excess. The rise in temperature is measured by a thermometer graduated to $^1/_{50}$° C., read with a magnifying glass to $^1/_{1000}$° C., and the resulting computations are then made for a standard of one kilogram of cement.

In this manner Tomëi found that 1 kilogram of different qualities of Stettin "Star" cement, made by the wet process, evolved the following quantities of heat: Slow-setting kind, 9.331 calories; cement made very slow setting by the addition of 0.5 per cent. of (hydrated) gypsum, 3.696 calories; cement which had become quick-setting by long storage, 7.752 calories; quick-setting cement with relatively low percentage of lime and high percentage of silica and alumina, 9.044 calories. Two other well-known brands of cement made from limestone by the dry process, and having a less uniform composition than the "Star" brand, both also containing an addition of 2.0 per cent. gypsum, evolved respectively 10.098 to 13.450 calories.

Kosmann's experiments with several commercial German cements exhibit similar results, and he adds that the time required for the setting and hardening of the samples ranged from 1 hour to 9 hours. He was, however, unable to discover a definite relation in any case between the time of induration and the quantity of heat evolved, but he believed that a more thorough study of the subject, in conjunction with the weight of water absorbed in hydration, will lead to the establishment of a good means of quickly comparing the qualities of different cements.

In commenting on the foregoing calorimetric results, Tomëi calls attention to the effect of storage on cement, whereby both the evolution of heat and the period of setting and hardening appear to be reduced considerably by the action of the air. In another instance, however, a different result was observed, as a slow-setting cement which had been stored for more than a year exhibited a much larger development of heat than when it was fresh. In view of such experiences, it is evident that much remains to be learned by the use of the calorimeter in examining hydraulic cements. He also refers to the effect of adding gypsum to the freshly made cement, and expresses the opinion that the influence of this substance may be much greater than has hitherto been assumed.

The evolution of heat by cement mortar and concrete is of much significance in the construction of masonry in cold weather, as it is obvious that if the quantity of heat developed is sufficient to prevent the mass from freezing, no damage can result from working during frost. It may also account for the many conflicting experiences that abound in technical literature in regard to the effect of frost on newly laid masonry, some claiming that no injury occurs, and others that such operations should be suspended when the temperature is below 32° F.

(*To be continued.*)

REFUSE DISPOSAL AND POWER PRODUCTION

The Latest Work on This Important Subject Reviewed by Col. W. F. Morse, Sanitary Engineer, New York

THE publication of such a book as "Refuse Disposal and Power Production," by W. F. Goodrich, M. I. C. E., London, England, marks a distinct advance in the work of one important department of municipal affairs. In a previous book by the same author, "The Economic Disposal of a Town's Refuse," the author traced the inception and development of the waste disposal work in England and the gradual development of large destructors which burn all worthless refuse and produce power for municipal purposes.

The first book was a revelation to American engineers and town officials, and it was welcomed and read by the authorities of all progressive towns and cities. This second book is, in one sense, a pendant to the first; it deals with the engineering side of the question, and considers the amount of power developed by destructors from the various classes of waste, the adaptation of the power to many municipal purposes, and the peculiar economic fitness of apparatus which employs for the purposes of the city the power that would otherwise be wasted.

Mr. Goodrich opens his book by treating of refuse "tipping" on land and at sea, and cites many instances of the unsanitary results of this method. He describes the early practice in New York City, when the garbage and refuse was dumped at sea and conveyed by the tide and waves back to the beaches of the seaside resorts near the city—although we are no longer subject to the reproach of our transatlantic kindred on this score.

The author gives a revised, illustrated list of destructors of the English type, dealing with each in a thoroughly competent and impartial manner, and setting forth the best points of each destructor as described by its own engineers.

COST OF LABOR AND FUEL PER TON

Tables of the comparative cost of labor per ton of refuse destroyed have been compiled from the reports of the principal towns of England, and make an interesting showing. It should be borne in mind that in Great Britain the sole cost for the disposition of the waste is that of the labor employed, the destructors requiring no fuel. A summary of the work of 144 installations, comprising all of the best types of destructors used in Great Britain, shows that they burn the town's refuse at an average cost of one shilling threepence per ton. This is for destructors employing various methods of charging, either by automatic overhead feed, or by hand-shovel at the back or front. In the London metropolitan districts, where six different makes of destructors are used in twelve installations, these destructors operate at a cost for labor of one shilling four pence (32 cents) per ton.

* This book is published by Constable & Co., London, England, and by E. P. Dutton & Co., New York. 384 pages, cloth, price $5.00 net, postage 22 cents.

In forty installations the power developed is fully utilized, with a cost for labor of 26 cents per ton. This latter statement is of very great interest to American engineers. None of the best types of our crematories can show a cost for operation for less than 45 to 65 cents per ton for labor and fuel. The latter item of cost, moreover, is entirely eliminated by the English destructors, as by their system of forced draught everything is destroyed without the use of coal.

Economy in Combining Refuse and Sewage Disposal Plants

Another point in the operation of these destructors of special advantage to cities and towns where sewage disposal plants are to be or have been established, is the use of the clinker from destructors as a filter medium in the bacteria beds of the filtration plant. Mr. Goodrich says, "A good vitreous clinker crushed and screened to the sizes required for both the coarse and fine beds furnishes at once not only the most satisfactory medium yet discovered, but likewise the most durable."

Again, "To the thoughtful citizen it must be interesting to know how one form of civic waste will, in the process of destruction, furnish the power for dealing with the liquid waste, and that the innocuous residue of the former offers the best known medium for the purification of the latter. To the sanitarium this acme of utility must appeal with force."

Another use for the residuum of the destructor is its conversion to mortar, and the making of paving flags, clinker briquettes, and other material for building. In Liverpool it has been proposed and sanctioned by the city government to build laborers' cottages composed of blocks of this material cast in special moulds, thus furnishing the laborer with a sightly and well built home at a modest rental.

Refuse Destruction Produces Electrical Power

The gist of the whole book is contained in three chapters describing the destructors combined with electricity works, with sewage disposal works and with water works.

The use of power destructors for producing electricity is admitted to be one of the most economical methods for employing the heat that has yet been demonstrated. The apparatus may admit of the storage of the power produced in the day time; or, if desired, the waste may be stored during the day and burned at night. The electrical power may be used in conjunction with the local supply of electricity for a large city without interference with the main installation. Thus we have a large supply of reserve electrical power, produced practically without cost, always at the command of the city.

A comparative estimate of the number of electrical units generated per ton of refuse destroyed at twenty combined electricity works shows a wide variation, running from 15 to 80 units per ton of refuse. But taking the average number, under the normal conditions at each plant, there is produced an average of 30 units per ton. This is equivalent to the power required for sixteen incandescent lamps per unit, or 480 lamps for each ton of waste consumed. The results are so creditable that they amply demonstrate the reason for the increase in Great Britain in the number of refuse disposal plants during the last three years.

Up to the present day, in Great Britain, sixty towns have installed, or have decided upon combined electrical plants with destructors, comprising in the aggregate 370 destructor cells or single grates, and 140 high pressure steam boilers. These plants destroy altogether over 3,200 tons of refuse per day, the heat from which is utilized for the purposes of the installation. In the London metropolitan boroughs alone, 800 tons of refuse are destroyed daily and the power used for generating electricity.

Power Used for Pumping Sewage and Water

The tenth chapter, devoted to refuse disposal plants in connection with sewage works, shows that this combination has not been so extensively adopted as the former. There are about thirty-eight towns having in all 150 destructor cells or grates, and sixty-eight steam boilers. These plants daily destroy about 1,100 tons of refuse, the power derived from which is applied to the pumping of sewage. There are some difficulties in the way of the use of destructors for this purpose, arising from the fact that the sewage works are usually not in a central location, involving the transportation of the refuse further than when delivered at electricity works which are ordinarily better situated.

Mr. Goodrich assumes that the combustion of five tons of town's refuse (which it will be remembered includes ashes and garbage and all combustible substances) would be sufficient to produce power to pump the sewage of a town of a population of five to seven thousand persons. This, of course, applies to the septic tank, or other systems where the sewage is raised from one level to another, and does not apply to works where sewage is treated by filter presses and the solid parts consumed in a destructor, and where more power is required on account of the larger amount of machinery to be moved.

Chapter eleven relates to the combination of destructor plants with water works, which has also not been so extensively employed. It is only in cases where the destructor can be located in conjunction with the pumping station that there is any possible chance of utilizing the power furnished by the waste for this purpose.

At Sheerness (population, 15,000), where the destructor has been erected in combination with the water works, the results attained have been most satisfactory. No coal whatever is used; the daily collection of refuse provides all the power required for lifting the town's water supply from deep wells. The location of this destructor is very central; it is in close proximity to the council building and only a few feet distant from a school house and dwellings. The income from this installation amounts to about $1,800 per year, effecting a reduction in the tax-rate of threepence in the pound.

Special Forms of Destructors

The remaining part of this very readable book treats of special forms of destructors, types of steam boilers and the use of the steam jet, and gives a particular account of the London metropolitan boroughs and their method of arranging the distribution of disposal plants. This is clearly

shown by means of a very concise and well formulated table for each borough.

In dealing with American garbage disposal methods, Mr. Goodrich quotes the report to the city government of New York by Mr. J. C. Bayles, M. E., on the condition of garbage utilization or reduction plants in New York City, which is given in full. This report is three years old, but it is the only authoritative report on the subject of reduction that has ever been published. Its present value seems to be largely from Mr. Goodrich's point of view, as serving to emphasize the very unsatisfactory conditions of refuse disposal in this country.

There is a cut of two American garbage furnaces, and one of a refuse destructor now operating in Boston. The details of some installations in Germany, Australia, Africa, and South America are given. The illustrations, ninety in number, are fresh and well done, and add much to the appearance of the work.

Mr. Goodrich's book makes it very clear what twenty-five years of work in England in waste disposal and destructor building means, and shows conclusively that progress has been made by the development of improved forms of crematories by competent engineers, and the general adoption of this highly sanitary and economic means of disposal by enlightened city authorities acting upon the advice and instructions of the best engineering skill in England. When such well-known men as Lord Kelvin and Sir Douglas Fox make a report upon the operation of a destructor furnace it is received with the respect and consideration that it deserves; and when an English city engineer, after due examination, recommends the adoption of a certain destructor as the form best suited to the requirements of the community contemplating the installation of one, his report is accepted as law and is not disputed or set aside by uninformed councilmen.

In sharp contrast to the thorough work that has been accomplished by English communities in this department of municipal affairs, are the present unsatisfactory and unhappy conditions existent in American towns and cities, and which will be reviewed in the next issue of THE MUNICIPAL JOURNAL.

GOVERNMENT OWNERSHIP OF RAILROADS

To Be Operated by the State Rather Than by the Federal Government—Telegraph Lines Should Be Operated by the Post Office

*By William Jennings Bryan**

I HAVE heretofore refused to take a position upon the question of the government ownership of railroads; first, because I had not until recently studied the subject, and, second, because the question had not been reached. Recent events have convinced me that the time is now ripe for the presentation of this question. Consolidation after consolidation has taken place until a few men now control the railroad traffic of the country and defy both the legislative and the executive power of the nation. I invite the readers of the MUNICIPAL JOURNAL AND ENGINEER, therefore, to consider a plan for the government ownership and operation of the railroads.

The plan usually suggested is for the purchase of these roads by the federal government. The plan, it seems to me, is more objectionable than a plan which involves the ownership and operation of these roads by the several States. To put the railroads in the hands of the federal government would mean an enormous centralization of power. It would give to the federal government a largely increased influence over the citizen and the citizen's affairs, and such centralization is not at all necessary. The several States can own and operate the railroads within their borders just as effectively as it can be done by the federal government, and if it is done by the States the objection based upon the fear of centralization is entirely answered. A board composed of representatives from the various States could deal with interstate traffic just as freight and passenger boards now deal with the joint traffic of the various lines. If the federal government had the railroads to build there would be a constant warring between different sections to secure a fair share of the new building and development, but where this is left to the State the people in each State can decide what railroads they desire to build or to buy. The maintenance of the track, the care of the stations, the handling of incoming and outgoing freight and passengers—all these things require the employment of men, and if the employment is left to State authorities instead of to national authorities, most of the objections that have been raised to government ownership will be answered.

The arguments in favor of the assumption of the ownership and operation of railroads by the government are numerous:

First, Extortionate rates would be prevented. So far it has been impossible to secure any real regulation of railroad rates. The railroads regulate the government instead of the government the railroads. When the government owns the railroads and operates them, there can be no question about the fixing of reasonable tolls.

Second, Discrimination would be prevented. At present the railroad authorities can kill one town and build up another, destroy one locality and enrich another. And these discriminations are not always made out of consideration for the interests of the railroad, but are sometimes made because of the investments of officials in the town or locality to be favored. Great injustice has been done by these discriminations, and no way has been found to prevent them.

But there is another kind of discrimination which is operating against the nation's welfare and progress, namely,

* By the courtesy of the editor of *The Commoner*, Hon. William Jennings Bryan, we are permitted to publish extracts from a recent editorial in that paper in which the public ownership of railroads, telegraph lines and the various municipal public utilities is advocated. As the question is a broad and important one we would be glad to have our readers continue the discussion. We will publish articles not exceeding a thousand words in length; one on the affirmative and one on the negative side in each issue, if our readers will furnish the matter.—[EDITOR.

the discrimination in favor of the large city as against the small one. To the railroads more than any other influence is due the fact that the population is being driven from the country to the city. With fair and impartial rates the small town might again hope to be the home of the small factory, and those people who are being crowded into the cities where they live without the economic, sanitary, intellectual and moral advantages which they deserve, would be scattered more evenly throughout the country to their own great benefit and to the nation's good.

Third, The politics of the nation is being debauched by money. This money is drawn from the great corporations that desire special privileges or immunity from punishment, and is used to corrupt not only the voters, but legislatures. How can this corruption be stopped so long as enormous wealth can be made by watered stock and by the exploitation of the public? The railroad is to a certain extent a monopoly. As soon as a line is built between two points the field is occupied and it is impossible to have competition. If a second road is built for the purpose of securing competition, the traffic between the two terminals must support two roads instead of one, and it is impossible for two roads to carry the passengers and the freight at as low a cost as the one road could. This being true, the result usually is that the competing lines are soon consolidated and the attempt at competition given up. Legislation has been attempted against consolidation, but so far such legislation has been very ineffectual. The benefits to be derived by the railroads from the destruction of competition are so enormous that they have thus far been able to protect themselves by the giving up of a small part of the benefit to those who are in a position to interfere with them, but whose views can be modified by an argument addressed to the pocketbook.

Fourth, Another objection to the private ownership of railroads has been forced upon me with increasing emphasis during the last few years, namely, the corrupting influence of these great railway corporations over the young professional men of the country. The railroads have lawyers in every county and general attorneys at every State capital. These men stand high in their profession and are usually men of character. Their connection with the railroad has in many instances made them not merely the attorneys for the road in legal matters, but lobbyists for the road in political matters. These men have controlled conventions, dictated nominations, written platforms and so shaped appointments that the masses have been ignored and their interests disregarded. The United States Senate to-day contains so many men who are obliged to the railroads that it has been impossible to secure an amendment of the interstate commerce law, although for years the Interstate Commerce Commission has been pleading for an amendment.

It is not necessary to believe that United States Senators actually draw salaries from these railroads at the same time that they draw salaries from the government, although it is known that salaries have been offered to senators by railroads having business before that body, and it is known to-day that there are men there who did receive salaries from railroads just before their election and it is not known that those salaries have been relinquished.

If the railroads were owned by the several States instead of by private corporations, the railroad officials would be selected by the people and responsible to the people, whereas now these attorneys are selected by the railroads, paid by the railroads and subservient to the railroads.

Fifth, Another objection to the private ownership of railroads—and it is an objection that all recognize—is the use of the pass in politics. In some of the States the constitution forbids the use of a pass by public officials, but even in such States officials sometimes use passes and when an official in such a State accepts a pass, having violated the law, he puts himself where the railroad can blackmail him and force him to vote for measures desired by the railroads.

So powerful is the influence of the pass that it was impossible to secure at the last session of congress consideration of a resolution, introduced by Congressman Baker of New York, asking whether the giving of a pass was a violation of the interstate commerce law. The Pennsylvania railroad and the Baltimore & Ohio road secured large appropriations from the last congress for the enlargement of the depot facilities at Washington, and it is a notorious fact that representatives of the roads were present in the lobbies of the capitol building giving passes to the members of congress who voted with them and refusing passes to the members who voted against their demands. Any one who has had any experience in politics cannot be blind to the fact that the use of the pass often controls conventions, determines the selection of legislators, governors and often judges. When the recipient acts upon questions that involve the interests of the people, either his mind must be influenced by favors received or he must constantly brace himself against that influence. These are some, not all, of the reasons that may be given in favor of the government ownership and operation of the railroads. By leaving the matter to the State each State can act for itself and be governed by the sentiment of the people, moving as slowly or as rapidly as that sentiment demands.

Whether the various roads shall be secured by purchase or condemnation is a matter that each State can decide for itself. It may be wiser to begin by building new lines where they are now needed and thus determine the value of the old lines by the operation of the new ones. But the means to be employed for the securing of the lines and the rules to be adopted for the operation of them, will be found easy after the public has determined that the people, acting through their government, should take upon themselves the work of controlling this great branch of the business of the people

While advocating the government ownership of railroads upon the same theory I espouse the cause of municipal ownership of municipal franchises. Private contracts for water, lighting and street car facilities have been the fruitful source of municipal corruption, and there is no solution of these municipal problems that does not involve municipal ownership. The progress made in this direction in European cities shows what can be done, and it is only a question of time when in each city in the United States the people

acting through their municipal government will do for themselves, without the intervention of corporations, that which is now done at greater expense by private corporations. The municipal operation of the street car lines will result in such a reduction in fares that people can live farther from the center of the city and thus secure healthier locations.

We have also reached a time when the Post Office Department should embrace a telegraph system as well as a mail system. While the telegraph lines do not reach as many people as the railroads do, and while the abuses to private ownership have not been so open and notorious, yet there is no reason why this nation should not do what other nations are doing in this respect. In the small towns the postmaster could act as telegraph operator and thus a great economy could be effected. In the larger cities the telegraph system could be under the control of the postmaster and such employees added to the postal service as might be necessary. It is safe to say that the cost of messages could be reduced one-half, and yet have the system self-supporting. There is no good reason that can be urged against the government ownership and operation of the telegraph system in connection with the postal department. The matter has already been investigated by congress and favorable action taken, but the influence of the telegraph companies exerted through their corporate interests and through the franking privilege has been sufficient thus far to prevent any action being taken.

MUNICIPAL SALOON REGULATIONS*

How to Remove Evil Influences from the Liquor Trade—The Line of Least Resistance—Conservatives and Extremists

By Hon. L. H. Chappell

MAYOR L. H. CHAPPELL

RUDYARD KIPLING formulated a code of laws for the wild beasts of the jungle, the preface of which would serve as an excellent key note of every code of laws. The following is Mr. Kipling's preface:

"Now these are laws of the jungle,
And many and mighty are they;
But the head and the hoof of the law,
And the haunch and the hump is—obey."

The regulation, and not the abolition, of the saloon trade is my subject. Under our Georgia system of local option, which permits each county to decide for itself the question of "wet or dry," my county voted "wet" some ten years ago. The vote was close enough to serve the valuable purpose of checking that spirit of defiance which frequently follows victory.

The method selected by a county is supposed to fit the conditions existing in that county. The subject before us is the proper regulation of saloons in cities where the saloon is a fixture by the consent of the people either tacitly or by election.

Atlanta, the capital of Georgia, tried prohibition for two years and, while the experiment was regarded as a very expensive one to that city, yet it was a valuable object lesson to other commercial cities, teaching moderation to both the Prohibitionists and the saloonist.

Experience and a careful consideration of the subject is apt to satisfy the student of municipal government that the regulations laid down by the city for the guidance of the saloon-keeper should be few, short and, above all practical, and rigidly enforced.

FUNDAMENTAL REGULATIONS

What the municipalities want are the vital and fundamental regulations which are applicable to all saloons in all cities—regulations which will be accepted by the fair-minded saloonist and agreed to by the fair-minded temperance men as matters of expediency.

The following, I think, will be found suitable for application in all cities, and their value would be enormously enhanced if they should become unchangeable:

First.—The absolute cessation of the saloon business on the Sabbath day.

Second.—A license sufficiently high to confine the business to the hands of persons of financial responsibility and to prevent the multiplication of saloons beyond the limit of easy surveillance by the police.

Third.—Confining the saloon traffic to the business districts.

Fourth.—Closing all saloons at midnight.

HOW TO REGULATE THEM

The question, how shall the municipal government regulate the saloon? is one which is calculated to call forth shades of thought and expression widely divergent. The attitude of the popular mind upon this subject may be illustrated by an imaginary magnetic yard-stick, divided into three feet of twelve inches each and having one of these feet at each end and the third foot in the middle—upon the negative end of this tripod we will group the arguments of those who honestly think that saloons need no regulation, and upon the positive end those who honestly think that the people need no saloons. The central section will then be left for the exhibition of the sentiments of that conservative, self-contained element which, fortunately, is found in every community and which serves as ballast.

Again subdividing each of these three sections of the

* Digest of a paper read before the League of Georgia Municipalities, at Savannah, Ga., August 10, 1904, by Hon. L. H. Chappell, Mayor of Columbus, Ga.—[EDITOR.

imaginary yard-stick, we find the influences which tend to make the saloon such a potent factor in our municipal affairs distributed along the twelve inches of the "saloon foot" about in the following order:

The Dead Game Sport

First.—To the professional gambler we must assign a prominent place among the saloon extremists; and we must not underestimate his influence with the men who control.

Second.—The saloon proprietor, middle-aged and prosperous, has for the past ten years been debating the advisability of syndicating his saloon interests, becoming a silent partner, joining the church, perhaps, and raising up his daughters so they may go into society. He has long since discarded the white apron. His son is perhaps a member of the aldermanic board.

Third.—The wholesaler, who rarely enters a saloon, except to inventory the items of a chattel mortgage, drinks little, if at all, and admonishes his drummers to stick to Apollinaris. He stands high socially and financially—is a most liberal advertiser through the medium of the local press, and his bookkeeper is, perhaps, a member of the police commission.

Fourth.—The real estate owner, who derives his revenue from the saloon rents, is a man of highest respectability and wide influence, and, as a slight concession to the more delicate proprieties of life, expresses a preference for a different class of tenants (at the same price), but leaves the decision to his renting agent, who is perhaps on the board of appraisers.

Penetrates all Classes

This brief enumeration will serve as examples to demonstrate how the influences back of the saloons penetrate all classes, and that the saloon does not depend for influence upon its patrons. Indeed, the steady and liberal patron of the saloon is not a man of influence in the community, but is himself subject to the influence of others; to this rule, however, a striking exception is found in the naturalized foreigner, who resents, in this land of boasted liberty, restrictions which are unknown in countries making small pretense of governing by the people and for the people.

At the opposite end of our graduated scale we find the professional reformer, whose earnestness is exceeded only by the impracticability of his plans. We find here also the pastors and many members of our churches, the recognized conservators of the morals of the community. With perfect consistency and unwavering fixedness of purpose, they point to the saloon as an element of evil in our midst, which, like an infectious disease, the demand must be held in check, while continuous search is made for the means of its final extinction. Finally we find here the rank and file of our pure and virtuous womanhood, who regard the saloon as a constant temptation and a source of danger to men.

We need make no effort to reconcile the differences between these extremes.

The practical city official soon realizes that his tenure of office, even though he should so trim his sails as to keep the boys voting for him throughout his natural life, is far too short to warrant the hope that he can reconcile these warring extremes; so he takes his place at the center of the scale, from which point he endeavors to maintain an equilibrium and avoid an open clash at the ballet-box.

Men Will Drink

Realizing that so long as the appetite remains men will partake of strong drink, and that a law not enforced brings his entire code into ridicule and contempt, he prefers the licensed saloon to the illicit blind tiger. Seeing that a multiplicity of saloons is obnoxious to the more conservative element of his fellow citizens, and demands a corresponding multiplicity of police, he checks this prolific tendency by a high license. Knowing that the location of a saloon in close proximity to the calm and sacred precincts of our home is a source of danger to our boys and a shock to the delicate sensibilities of our wives and daughters, he confines the liquor traffic to the business districts. And believing that some effort is due from the municipal government to check the evils of the all-night debauch, he prescribes what may be termed the drunkard's curfew.

These rules cannot be regarded as extremely stringent by those interested in the liquor traffic, and should not be considered as extremely lax by those who regard the saloon as an unnecessary evil. Rigidly enforced, they are calculated to allay irritation in the minds of reasonable men on either side of the question and are not so severe as to tempt illicit evasion.

An effort to violate the Sunday or the midnight closing regulations should be punished by revoking the license, forfeiting the amount paid therefor and refusing a new license to the offender.

In order to attain a fixedness of purpose and take the saloon question so far as possible out of municipal politics, the regulations once agreed to should be incorporated in the charter of the city, thus minimizing the tendency to measure every candidate for aldermanic martyrdom by the saloon yard-stick.

REPAIR ASPHALT PLANT FOR OMAHA

The city council of Omaha has appropriated $10,000 for the construction of a municipal asphalt repair plant, and plans are under way for its establishment under contract during the present year. City Engineer Rosewater made a trip to Winnipeg, Detroit, Washington, New York and Indianapolis to secure information for the work. He is authority for the statement that repairs made by contractors in Omaha have contained from ten to thirty per cent. less asphalt than the specifications called for. It is possible that the council may decide to install a plant capable of doing original paving, as warring contractors have prevented any new paving in the city for two years. The asphalt plants at Winnipeg and Detroit and their operation have called forth the admiration of Engineer Rosewater.

METERS—THEIR USES AND BENEFITS

Meters Reduced Cost to Taxpayers—Flat Rate Unjust—Meter Rate Properly Adjusted—Good Results

Park Woodward *

Much could be said in favor of the universal meter system for all water works plants. But having had a practical experience for the past twenty years in the use of meters here, I will confine myself to what they have done for Atlanta.

Prior to 1885 there were no meters in Atlanta. The rate charged for water was regulated by the number of outlets used by consumers.

Increased Consumption Demanded a Greater Supply

The consumption of water became so great that it resulted in the necessity of adding to our pumping machinery in order to supply the demand for water and at the same time to give the necessary fire pressure. After a new pump was added and put in operation it was found that the force main leading from the pumping station to the city was too small for the demands made upon it. The loss by friction was enormous, resulting in a great strain upon the pumps and the pipe in the immediate neighborhood of the pumping station, and it was found impossible to give adequate fire pressure.

The only remedy left was to put in an additional and larger main. But the cost of putting in this main was only to be had by an extra rate of taxation being levied upon the people. This was extremely unpopular, and the idea was therefore abandoned, and an effort to arrive at some other remedy was considered. In the meanwhile the insurance companies complained of the insufficiency of fire pressure; and tnen it was determined to try the meter system. It was known that a large per cent. of the water pumped was allowed to run to waste; and to effectually stop this waste it would be necessary to make the consumer pay for it. So we adopted then the universal meter system.

Much complaint was made at the time, it being argued that it was unjust to require water consumers to pay for meters to measure the water they paid for. But the Board contended it was the only equitable way, for it was manifestly unfair to take the money from the general tax fund to put meters on consumers in about one-third the territory of the city where water mains were laid, and therefore require those who lived out of the reach of the water supply or fire protection to pay for meters used by those more fortunate in having the comfort and convenience of water supply and fire protection and decreased rate of insurance.

Meters Saved Money for Taxpayers

The introduction of meters saved money for the general taxpayers of this city, for without their use the rate of taxation would have been increased in order to raise a sufficient amount of money to pay for an additional main, more pumping machinery and larger reservoir and other necessary additions to the plant, estimated at that time to cost approximately $150,000 or more.

As an illustration of the result of the introduction of the meter system here, the pumpage for the month of November, 1884, when we had no meters, was 132,679,900 gallons, and the coal consumed was 575,000 pounds, being an average pumpage of 4,442,663 gallons per day and the consumption of 19,166 pounds of coal per day.

For the month of November, 1885, with the meters in service, the pumpage was 48,130,000 gallons, showing a decrease in pumpage of 84,549,900 gallons for the month. The coal consumed was 256,000 pounds, showing a reduction in the consumption of coal of 319,000 pounds for the month. The reduction in pumpage was 2,818,330 gallons per day, and in coal of 10,633 pounds per day. If meters had not been introduced our daily pumpage now would be about 25,000,000 gallons per day instead of 8,000,000 as it is, and the outlay necessary to put the plant in condition to meet the demands would have been over a million dollars more than has been spent on it.

Fixing the Meter Rate.

One argument against the use of meters is that it reduces the income. This, of course, depends on what is charged. A minimum rate can be fixed and a maximum amount allowed for that rate. We charge here 80 cents per month for 6,000 gallons or less, and allow a discount of 25 per cent. on all bills paid on or before the 10th of the month following the month of consumption. And we charge 10 cents per 1,000 gallons net for all used over the 6,000 gallons.

The average domestic consumption here is 3,500 gallons per month. It must be borne in mind, however, that our accounts close each month, so that the minimum rate and maximum allowance commences with the first of each month. The revenue here under the meter system has grown from $32,000 in 1886, to $178,000 in 1903, and it will be over $200,000 in 1904. And in addition to this the city service, that is, fire, sewer, public buildings and grounds, etc., used in 1903, $160,000 worth of water, the same being charged for at the rate it would have been charged had the plant been owned by a private company. Of course, no money was paid for this service, but the Water Department took credit for it, as they were entitled to, so as to show the actual earnings of the plant.

Manufacturers Charged a "Scaling Rate"

Manufacturers are charged a scaling rate of 10 cents per 1,000 gallons net for 75,000 gallons, and scaled each 75,000 gallons ½ cent per 1,000 gallons until it reaches 6 cents per 1,000 gallons. The scaling rate then stops, and all water consumed after 90,000 cubic feet is charged for at the rate of 6 cents per 1,000 gallons net. We have two pumping stations, and the estimated cost to deliver the water, counting operating expenses and interest on the bonded debt, last year was 5-7-10 cents per 1,000 gallons; so that manufacturers get water practically at cost over and above 90,000 cubic feet.

* General Manager Atlanta Water Works, who read this paper before the last session of the American Water Works Association, at St. Louis.—[Editor.

The appended table will give the result of water consumption, coal consumption and income since the adoption of the universal meter system. I also append, for comparison, a schedule of the flat rates in force before the adoption of the meter system.

TABLE SHOWING RESULT OF ADOPTION OF METERS.

Year.	Total No. Taps.	No. Taps Metered.	Gals. Water Pumped.	Pounds Coal Burned.	Income.
'83	1,663	95	859,448,080	4,701,700	$31,010.20
'84	1,832	570	1,148,420,700	5,624,400	35,763.95
'85	1,973	*	876,055,000	4,286,000	39,293.33
'86	2,077	1,372	574,925,000	3,008,300	32,745.48
87	2,192	†	628,478,300	3,509,900	38,066.95
'88	2,464	all	628,931,300	3,402,900	38,286.35
'89	2,883	all	756,762,600	4,070,320	56,369.50
'90	3,273	all	861,241,100	4,683,800	63,438.97
'91	3,759	all	942,966,730	5,097,900	74,431.90
'92	4,533	all	923,451,700	5,506,600	79,695.61
'93	4,934	all	1,296,550,800	8,348,000	81,822.71
'94	5,544	all	no data	5,459,100	65,452.61
'95	5,962	all	1,657,549,110	6,222,700	73,562.83
'96	6,496	all	1,814,963,500	5,647,900	83,339.39
'97	7,176	all	1,895,623,800	6,364,600	92,484.92
'98	7,974	all	1,807,661,800	6,096,100	103,774.54
'99	8,592	all	1,996,908,200	6,098,500	116,302.66
'00	9,277	all	2,146,635,700	6,741,300	133,819.26
'01	9,926	all	2,261,947,100	7,709,400	141,867.09
'02	10,676	all	2,511,687,200	7,884,900	157,041.03
'03	11,654	all	2,484,954,300	8,380,988	177,730.50

New plant put in operation in 1893. Old plant abandoned in 1904. In 1904, meter rate reduced from 17 cents to 10 cents per 1,000 gallons. * Meters generally introduced. † Practically all taps metered.

You will notice that the income for the year 1885 was $39,293, that was under the old rate of 20 cents per 1,000 gallons; it being optional with consumers up to that time to take the flat rate or the meter rate, and for 1886, $32,745.48 (under the new rate of 17 cents per 1,000 gallons and all on meters), a falling off in receipts of $6,547.85. This shrinkage in receipts was more than compensated for in the amount of coal saved and water pumped.

In 1885 we pumped 876,055,000 gallons of water and burned 4,286,000 pounds of coal. In 1886 we pumped 574,925,000 gallons of water and burned 3,008,300 pounds of coal, making a difference in that year over the year previous of 301,130,300 gallons less of water pumped, and 1,277,700 pounds less of coal burned; this relative difference goes on "ad infinitum."

FLAT RATES.

	One Story.	Two Stories.	Three Stories.	Four Stories.	Five Stories.
14 feet and under	$5.00	$7.00	$9.00	$11.00	$13.00
14 feet to 16 feet	6.00	8.00	10.00	12.00	14.00
16 feet to 18 feet	7.00	9.00	11.00	13.00	15.00
18 feet to 20 feet	8.00	10.00	12.00	14.00	16.00
20 feet to 22½ feet	9.00	11.00	13.00	15.00	17.00
22½ feet to 25 feet	10.00	12.00	14.00	16.00	18.00
25 feet to 27½ feet	11.00	13.00	15.00	17.00	19.00
27½ feet to 30 feet	12.00	14.00	16.00	18.00	20.00
30 feet to 32½ feet	13.00	15.00	17.00	19.00	21.00
32½ feet to 35 feet	14.00	16.00	18.00	20.00	22.00
35 feet to 37½ feet	15.00	17.00	19.00	21.00	23.00
37½ feet to 40 feet	16.00	18.00	20.00	22.00	24.00
40 feet to 45 feet	18.00	20.00	22.00	24.00	26.00
45 feet to 50 feet	20.00	22.00	24.00	26.00	28.00

Note.—All finished basements shall be taken as one story additional.

The family occupying the dwelling house to number not more than ten (10) persons, and for each person beyond that number 50 cents per year shall be charged. Dwelling houses occupied by more than one family shall be charged as follows: viz.:

The second family, one-third (1-3) of the regular rates.
The third family, one-fourth (¼) of the regular rates.
The fourth family, one-eighth (⅛) of the regular rates.
Each family over four families, one-eighth the regular rates.

Or extra families shall be charged such rates as may be determined upon in the discretion of the Board.

And the Board do further establish that the extra and miscellaneous rates shall be as follows:

Stores and places of business occupied by one party when not over twenty-five (25) feet front, $6 per annum. For each additional ten (10) feet or part thereof, $3 per annum. Stores when occupied by more than one party will pay dwelling house rates.

Bakeries that average a barrel of flour per day, $3.50 per annum.

Offices of professional persons, from $3 to $5 per annum.

Saloons, in addition to frontage, $6 to $100 per annum.

Hotels, in addition to the regular rates, for frontage will be assessed for each room, $1 per annum.

Taverns and boarding houses, in addition to regular rates for private families, for each room $1 per annum.

	Per annum.
Bathing tubs	$3.00
(Private dwelling of one family) 2d tub	2.00
(Private dwelling), over two, each	1.00
(Public), each	6.00
Water closets	3.00
(Private dwelling, one family), 2d closet	2.00
(Private dwelling), over two, each	1.00
(Hotels, taverns, boarding houses, places of amusement and blocks)	6.00
(Public)	6.00
Urinals, first	3.00
(Private dwellings of one family), 2d each at	2.00
(Private dwelling over two each)	1.00
(Hotels, taverns, boarding houses, places of amusement and blocks, each	3.75
Building purposes for each 1,000 brick or perch of stone used	.05
For each 100 sq. yds. plastering	.14
Steam engines, each horse power, 10 hrs. per day	5.00
Printing offices, according to the number of persons, not including steam engines, from	6.00 to 40.00
Printing offices, first power press	6.00
Balance press	4.00
Hand press	2.00
Private stables, for each horse up to two	2.00
Additional horse over two	1.50
Livery stables (including washing of carriages), each horse	2.00
Dray and team horses	1.00
Street sprinklers, for each tub per month	25.00
Brewers, for each 1,000 gallons taken	.20
Distillers, for each 1,000 gallons taken	.20
Railroad depots, each locomotive (trip out) from	75.00 to 100.00
Gas works, from	100.00 to 300.00
Fountains, one-sixteenth of an inch jet, in use four months in year, average use three to four hours per day	15.00
Fountains, one-eighth jet, in use four months in the year, average use three to four hours per day	60.00
Vegetable fountains, each	3.00
Use of hose, four hours per day in summer	3.00
Work shops for four persons or under	3.00
Manufacturer's frontage	6.00
Each additional person over ten	.25

All manufacturing and other business requiring a large supply of water are to be charged therefor per 100 gallons at the average estimated quantity during the year. The year to be estimated 300 days as follows:

When the quantity used averages from 200 to 300 gallons per day, at the rate of 4 cents per 100 gallons.

When the quantity used averages from 300 to 1,000 gallons per day, at the rate of 3½ cents per 100 gallons.

When the quantity averages from 1,000 to 5,000 gallons per day, at the rate of 3 cents per 100 gallons.

When the quantity averages from 5,000 to 10,000 gallons per day, at the rate of 2 cents per 100 gallons.

When the quantity used exceeds 10,000 gallons per day, the price will in no case be less than 1 cent per 100 gallons.

METER RATES

Meter rates must be paid monthly, at the rates of 20 cents per thousand gallons.

	Per annum.
Guano works (assessed).	
Ice manufactory (assessed).	
Elevators, per 1,000 gallons	$0.20
Cow	1.00
Dyeing and scouring, from	25.00 to 100.00
Filling cistern, from	5.00 to 20.00
Hat manufactory, from	30.00 to 100.00
Ice cream saloon, from	15.00 to 20.00
Laboratory, per 1,000 gallons	.20
Oyster saloon, from	15.00 to 30.00
Packing house, per 1,000 gallons	.20
Photograph gallery, from	20.00 to 40.00
Ale or porter cellar, from	40.00 to 50.00
Rectifying whiskey, per barrel	.03
Soda or mineral water manufacturing, per 1,000 gallons	.20
Starch manufactory, per 1,000 gallons	.20
Stock yards, per 1,000 gallons	.20
Sugar refinery, per 1,000 gallons	.20
Tannery, per 1,000 gallons	.20
Vinegar manufactory, per 1,000 gallons	.20
Washing bottles, from	5.00 to 20.00
Washing barrels, per barrel	.05
Washing meats, per 1,000 gallons	.20
Wine cellars, from	20.00 to 50.00
Barber shops, one chair	5.00
Each additional chair	3.00
Blacksmith shops, one furnace	3.50
Each additional furnace	1.75
Tailor shops, for ten hands or under	3.00
Each additional hand	.30
Shoe shop, for ten hands or under	3.00
For each additional hand	.30
Wholesale clothing, ten hands or under	3.00
Each additional hand	.30
Boot and shoe factory, for ten hands or under	3.00
For each additional hand	.30
Renovating establishments (assessed).	
Soap factory, per 1,000 gallons	.20
Paper mills, per 1,000 gallons	.20
Woolen mills, per 1,000 gallons	.20
Eating houses, from	10.00 to 30.00
Billiard saloons, per table	3.00
Slaughter houses, per 1,000 gallons	.20
Stone yards, same as workshops.	
Theaters, concert halls and other places of amusement (to be assessed).	
Banks, from	6.00 to 12.00
Steam apparatus for warming public halls, theaters, and other buildings (to be assessed).	
Book bindery, not less than	10.00
Candy factory, from	15.00 to 75.00
Cigar factory, per hand	2.00
Club room, from	15.00 to 75.00
Confectionery, from	15.00 to 75.00
Laundry (to be assessed).	

GARBAGE COLLECTION IN SCHENECTADY

How One of the Leading Cities of the Empire State Proposes to Collect and Dispose of Its Waste

A NEW garbage ordinance presented at a meeting of the Common Council of Schenectady, N. Y., embodies a complete system and is an outline plan of removing the garbage of the city in a thoroughly up-to-date manner. Among the first sections of the ordinance will be noticed a detailed definition of the terms "garbage," "rubbish," and "ashes." The ordinance provides for the removal of all garbage at least twice a week in winter and three times a week in summer.

The system when in working order provides for the removal of garbage in covered wagons. Some of the wagons used in the metropolis are not all of this type. The details of the ordinance will all have to be settled by the Board of Contract and Supply, which will have full power over the letting of the contract and the manner of carrying it out.

The system should be in operation on or before April 1, 1905.

Albany is now about the only large city in the State of New York where a system of garbage removal is not in use with the single exception of Schenectady, and it is proposed to install one in Albany in the very near future.

Here is the ordinance:

Section 1. The word "garbage" as hereinafter used means all refuse animal and vegetable matter. The term includes house, store, market, hotel, restaurant, saloon and stable offal, waste, decayed fruit, vegetables, meat and fish; also dead animals, weeds, grass and waste garden products and garden refuse and kindred articles. It excludes night soil, cess pool contents, street sweepings, paper, building materials and building refuse, excavation materials and trees cut down.

The word "rubbish" as hereinafter used means all waste matter not animal or vegetable. The term includes old bottles, tins, iron, boots, shoes, rubber, paper, rags, utensils, boxes, wood, building materials and building refuse not to exceed one-half yard at any one premises and kindred articles. It excludes garbage as above defined, night soil, cess pool contents, street sweepings, factory waste materials or products.

The word "ashes" as hereinafter used means all ashes except of manufacturing establishments, factories, locomotives, public heat, power and light establishments.

The term "garbage, rubbish and ashes" are not intended to include the debris of burned or fallen buildings or of building operations or repairs or land improvements exceeding in amount a half yard at any one premises at any one time in any month.

Sec. 2. It shall be the duty of the contractor, hereinafter named, to collect and remove from the several premises in the city of Schenectady the garbage, rubbish and ashes contained in the receptacles provided in the preceding section hereof between the hours of seven in the morning and six in the evening in a clean and orderly way, with the least annoy-

ance to the tenant, and return to their several places said receptacles after removing the contents thereof; the removal of garbage to be in steel carts, water tight, provided with a cover, which carts shall be neatly painted and numbered and kept clean and washed and deodorized daily; the rubbish and ashes to be removed in carts neatly painted and numbered, provided with a cover, kept clean and so constructed and so maintained that no rubbish or ashes shall drop or sift therefrom in transportation.

Said contractor shall make such removal from each and every premises or part thereof occupied by a family, three times in each week from May 1 to October 1 in each year and twice in each week from October 1 to May 1 following, the particular days in each week on which such removal shall be made to be determined by the Board of Contract and Supply in the making of the contract and specifications relating to the collection, removal and disposal of garbage, rubbish and ashes herein.

The contractor shall dispose of said garbage, rubbish and ashes at places and by means to be provided and maintained by the contractor, which shall be at such places and by such means and in such manner as shall give rise to no noxious or offensive odors, gases, or dust, or otherwise be injurious to the health or comfort.

The contractor shall furnish all the means, appliances and labor necessary for the collection, removal and disposal of garbage, rubbish and ashes, except the receptacles above provided for on each premises, and shall collect, remove and dispose of such garbage, rubbish and ashes as provided by his contract under the supervision of the Commissioner of Public Works.

Sec. 4. Whenever any premises are quarantined by the Health Officer or any infectious or contagious disease is known to exist at any premises, the contractor shall remove the garbage, rubbish and ashes from such premises during the continuance of the quarantine or the disease and dispose of the same only under the direction of the Health Officer of the City or the Board of Health.

Sec. 5. Where a street becomes temporarily impassable for vehicles during the making of street improvements or repairs, laying of water, sewer or gas mains or other conduits, the contractor shall remove garbage, rubbish and ashes at the regular periods in a manner sanctioned by the Commissioner of Public Works whose direction shall be obtained in writing by the contractor.

Sec. 6. The contractor shall specify in his bid the manner in which he intends to dispose of the garbage, rubbish and ashes.

Sec. 7. The Board of Contract and Supply shall prepare specifications for the work of collecting, removing and disposing of garbage, rubbish and ashes in accordance with this ordinance with the requirement that the contractor dispose of the garbage by burning at a garbage disposal plant to be erected and maintained by the contractor and with an alternative requirement that the garbage be buried at a place or places to be furnished by the contractor outside the limits of the city, the contractor in his bid to state the method of disposal of garbage proposed by him.

Sec. 8. The Board of Contract and Supply shall on or before the 31st day of December, 1904, in the method prescribed by the charter, advertise and let a contract for the collection, removal and disposal of garbage, rubbish and ashes as above provided.

The term "contractor" as used in this ordinance means the person, firm, association or corporation to whom or to which shall be awarded a contract by the Board of Contract and Supply for the collection, removal and disposal of garbage, rubbish and ashes.

Sec. 9. This ordinance shall take effect immediately.

OHIO STATE HIGHWAY DEPARTMENT

By an act of the 76th General Assembly of the State of Ohio, at its regular session, a State Highway Department was ordered established. The following extracts define the organization and work of the department:

"A State highway department shall be established by the appointment of the Governor of the State with the advice and consent of the Senate, for the term of four years, of a State highway commissioner, who shall be a competent civil engineer, and experienced in the construction and maintenance of improved roads," further providing for the appointment of assistants and clerks "as the work of the department requires."

"The object and purpose of this department shall be to instruct, assist and co-operate in the building and improvement of the public roads, under the direction of the highway commission in such counties and townships of the State of Ohio as shall comply with the provisions of this act.

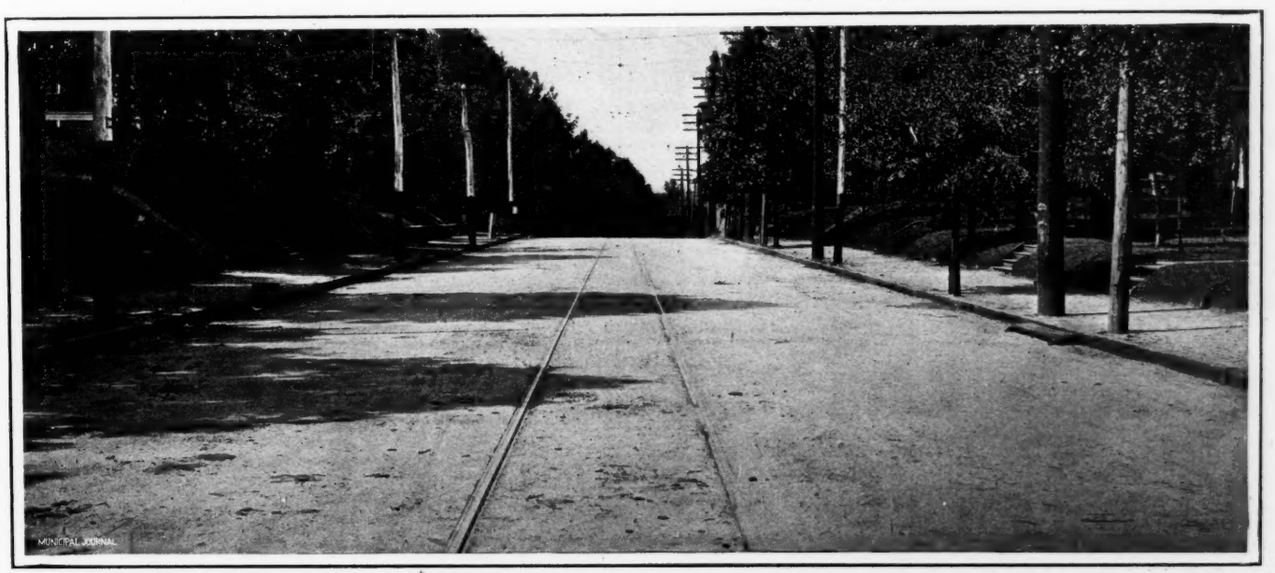
"The highway commission may make inquiries in regard to systems and road building and management throughout the United States, and make investigations and experiments in regard to the best kinds of road material and investigate the chemical and physical character and road materials, and to prepare, publish and distribute bulletins and reports on the subject of road improvement."

Under the provisions of this act Governor Herrick, on the 30th day of June, 1904, appointed Mr. Sam Huston, of Steubenville, as Commissioner of Highways. Mr. Huston is a Civil Engineer of long standing and experience, was County Surveyor and Engineer for Jefferson County from January, 1886, to September, 1901, during which time he had charge or supervision of the construction of about one hundred and fifty miles of improved roads of greater or less degrees of excellence. He has made a study of the improvement of roads and personally examined roads from Massachusetts to California, and is well versed in the merits and defects of laws relating to roads especially in his own State.

Many of the counties in Ohio have a large number of miles of improved roads, constructed under various laws. Ohio has "One Mile Assessment Laws," "Two Mile Assessment Laws," "County Pike Laws," and a great many special laws. One peculiar feature is that not one of these general or special laws provides that the location and construction of the improved roads specified therein, shall be under the direction, as to location and construction, of practical road builders. The result has been that in most of the counties having improved roads, any merits that may attach from the manner of location and construction has been derived from the lessons that have ensued from the actual construction of the first roads built therein, rather than as the result of carefully prepared plans and methods of construction devised by those that had special preparation and experience and that had given road methods careful and scientific study. Through these methods of procedure many counties have come up to the construction of roads of great merit, but necessarily the result acquired has been at great cost in securing the dearly bought experience. Some counties that have spent hundreds of thousands of dollars in road improvement have roads that are incomparably better than the roads in their original condition, yet have not a single mile of road that comes up to the highest standard of construction. A large number of counties have made no effort toward improvement, their roads being impassable for wheel vehicles for weeks each year.

It is hoped the new Department of Highways will be able to introduce systematized and modern methods in all the counties of the State, and will induce all the counties to construct improved roads, if only by building short or sample roads, for such sample roads, bringing directly to the attention of taxpayers their advantages, result in an urgent demand for roads available for travel under all conditions.

The history of road improvement in Commissioner Huston's own county well illustrates the benefit of object lesson roads. In 1886, a special law empowered the County Comissioners to improve a road two and one-third miles long, leading from the county seat to the county infirmary. This road was located in three of the fourteen townships of the county, and was constructed according to the standard of road building of that day. The use of that short road led to a county movement for better roads in 1890. Delegations from all the townships met, but seven of the delegations, that had seen little or nothing of the infirmary road, came determined to resist any movement for good roads, deterred by the proposed taxation. The other seven delegations decided to make an independent effort for improvement in their townships, consisting of the three in which the infirmary pike was located and four others nearest thereto. A special aet empowered the County Commissioners to submit to the qualified electors of those seven townships the question of construction together with the authorization of bonds and the necessary taxation. This election resulted in approval in five of the townships and the construction of seventy-eight miles of improved roads, the notable fact in the result being that the townships voting no were those of the seven located farthest from the infirmary road. Two of the roads constructed terminated at the south boundary line of one of the negative townships, and the use of these roads educated that township to submit the question of a township sysem in the year 1896. In 1890 the county seat (city) was to be taxed for construction and actually paid six dollars of every ten in the construction of the seventy-eight miles, while the proposition in 1896 was to construct by the township alone. The vote of the township in 1890 was for construction, 197; against, 461. In 1896, proposing to build by the township tax alone, 400 for tax and construction and 150 against. This change of sentiment well illustrates what it is hoped to accomplish by the construction of sample roads over the State, and together with organized effort, scientific investigation and construction bring Ohio to the forefront in road improvement.



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The City's Parks*

How shall we secure a better popular utilization of public squares, gardens, parkways, and parks in the United States? This is a question of concern to every citizen, and especially to those who are members of local organizations,—or of national organization like the American Park and Outdoor Art Association,—which exist to make pleasanter community life.

One indispensable condition for the adequate use of public reservations is security against violence, and fear of violence, and even against annoyances, or the sight of rude or disorderly conduct. All public reservations, whether large or small, need to be well policed, so that women and children can feel perfectly safe in them. This is, of course, an expensive matter; but neither city playgrounds nor country parks will be adequately used by the persons who need them unless they are intelligently and adequately policed. A public beach, grove, or forest, will soon get a bad reputation if it is not vigilantly watched. Every city square or garden should be brightly lighted: first, because light is the best policeman, as Emerson said, just as publicity is the best safeguard against financial and industrial wrongs; and, secondly, because every such open space should be treated as a public parlor or popular reception-room.

Again, it is useless to provide a public forest, or a large country park, five or ten miles from the center of the city, unless this distance can be traversed in an agreeable manner at a low fare. Hence the value of parkways, which are merely well-built, decorated highways, reserved for pleasure travel. In all such parkways through which large reservations are approached there should invariably be a separate space for electric cars; and this should be neither paved nor asphalted, but turfed, as a protection against dust and reverberated noise, and as a means of health for the adjacent rows of trees and shrubs. This practice has been already partially adopted, but should become universal.

In every large public park ample provision should be made for eating and drinking in the open air—from baskets, if there be no restaurants in the place. Steady efforts should be made to develop this habit among us Americans. It is by no means necessary that the refreshments should be elaborate or alcoholic. Indeed, it is much better that they should not be. Tea, coffee, cocoa, or milk, with rolls or toast and jam, cheese, or herring, will go a long way toward making people feel comfortable and pleased. But it is impracticable for a family to spend many hours on a playground, or a beach, or in a forest, unless provision is made for eating and drinking. There should be an ample and convenient supply of water; there should be shelters from sun or sudden rain; and there should be everywhere a perfect tidiness. Regulations against scattering paper and leaving behind remnants of food or boxes or bottles should be rigidly enforced; but the habit of eating in the open air in families or companies of friends should be vigorously encouraged and promoted in all public reservations. Thus it is legitimate and desirable to provide rustic tables and benches in all places suitable for lunch or supper parties; for some men and women object to sitting on the ground, even when it is dry.

One would suppose, from the deserted aspect of the parks in winter, that New England people had never observed that winter is nearly as interesting a season in the open air as summer, the beauty of ice and snow replacing the beauty of foliage. On the whole, winter is a far better season for walking in public parks and forests than summer is. One sees much more of the broad scenery when the leaves have fallen. Moreover, it is a mistake to put away one's bicycle in winter. Wherever there are well macadamized roads, it is possible to ride a bicycle very comfortably on many winter days, particularly in the early morning before the wind has risen or the sun has softened the surface of the roads. I need not say that the winter aspect of a forest, after a fresh fall of snow or after cold rain has frozen upon every twig and lingering leaf, is one of extraordinary beauty. Less understood is the beauty of bare trees, of the half-frozen brook, and of the blue shadows in the fields of snow.

In scenery parks the enjoyment of the people can be greatly promoted by providing numerous foot-paths, leading to the best points of view and to seats there provided. These paths should, of course, be nothing more than trails from which the underbrush and other obstacles to passage have been removed. Seats at good points of view are very important parts of this provision. The people need to be tempted to linger in the parks for hours, and to do this without covering great distances or enduring anything which can properly be called fatigue. It is the open air and the quiet aspect of nature which are wholesome and refreshing; and to get the benefit of these influences takes time and a sense of leisure and restfulness. In like manner in small city squares the provision of seats is indispensable to popular enjoyment of these open spaces. Small squares in the midst of a dense population should be open-air parlors, resorts for the feeble and infirm rather than for the strong and tireless.

*Excerpt from a recent article in *The Christian Register*, Boston.

In all tree-planted avenues or boulevards chairs should be provided either by the municipality or by persons who have paid the municipality for the privilege of letting chairs.

The appropriate pleasures of forest reservations or country parks are all cheering, refining, and cleansing. They are soothing and uplifting. They separate city men and women from the squalor, tumult, and transitoriness of the human ant-hill, and bring them face to face with things calm, lovely, grand, and enduring. At the park and the beach men and women can lift up their eyes to the hills and the sky, or look to the infinite verge of the ocean, or come face to face with some of the endless varieties of beauty in color, form, and texture with which the surface of the earth is decked. It is, then, for the elevation of human nature on its every side that the better utilization of public reservations is to be urged.

CHARLES W. ELIOT, LL.D.

Wanton Waste of Water in Buffalo

THE whirligig of time brings its revenges and it is with a sense of satisfaction that we observe that at least one reputable local authority in Buffalo has awakened to a realization of the criminal stupidity which is at the basis of the wanton waste of water in that city. Years ago when we first pointed out the folly of a system which made such waste possible, we were ourselves criticised for our opinion, and notwithstanding our suggested remedy for the defective system, nothing was done to better the conditions then and now existing. It was impossible to arouse any local indignation over the wilful waste of water, for which the people of Buffalo had to pay.

The Buffalo *Express* is now experiencing a lively if tardy awakening to the serious condition, whereby to use its own words: "It is costing us not less than $150,000 a year for the water that is wilfully wasted. And if a filtration plant is to be built it certainly should not be built on the basis of 324 gallons of water for every inhabitant of the city." The *Express* also points out that the figures bearing on this point are not new and that they were tabulated years ago. "Everybody in Buffalo ought to know," it says, "that we are more extravagant in our use of water than the people of any other American city."

Buffalo pumps daily the extravagant total of about 324 gallons of water for every man, woman and child in her limits. That was the average for the year ended June 30, 1903. The amount has increased steadily for some years and therefore it is fair to presume that for the last fiscal year it was more than for the year previous. While Buffalo was pumping 324 gallons daily for each of its inhabitants, Pittsburg was next in line with 246; Philadelphia, 233; Cleveland, 165, with the other large cities of the country in a decreasing amount, until Newark is reached with 100 gallons. Manhattan furnishes 135 gallons per capita. Milwaukee gives 81, Toledo 70, and Fall River, 40. Here is a wide divergence, and yet we have not heard that in any of the cities the inhabitants are suffering from a scarcity of water.

There appears to be no necessity of increasing the pumping capacity of the city's plant, but there is urgent necessity for action in the matter of the waste of the public money through extravagance in the use of water.

Health Officer on Venereal Diseases

FREDERICK W. SMITH, M. D., Health Officer, in his report dated December 31, 1903, to the Commissioner of Public Safety of the City of Syracuse, has this to say regarding venereal diseases:

"Sanitary authorities in this country almost universally ignore this class of diseases, notwithstanding the fact that there is no other disease or class of diseases so far reaching in their effects by their influence on posterity in the causation of degeneracy, in the production of blindness, impaired vision or deafness and various nervous diseases. These diseases affect a surprisingly large number of people, but unfortunately do not destroy life quickly. Many lives are shortened after years of wretched existence often ended in the alms house or insane asylum or by joining the ranks of the suicide. The subject of the prevention of venereal disease is as perplexing as it is disagreeable, and thus the more deserves our serious consideration. I am not in favor of the legal regulation or licensing of prostitution, but believe much good would result from an examination by the Police Surgeon or other competent physician of all prostitutes coming under the supervision of the Police Department or before the Police Justice, who should sentence those found diseased to the Penitentiary Hospital until they can no longer transmit disease, instead of permitting them to go with the usual fine of $25 and no investigation as to their being diseased. While this method of treating the subject is not without fault, it has the merit of restricting, in a measure at least, the social evil and its serious consequences, without giving the evil the sanction of law. In justification of the procedure advised I wish to say that in a recent competent examination of about seventy prostitutes, in a city not larger than Syracuse, 60 per cent. of them were found capable of transmitting disease more terrible in its ultimate results than typhoid fever, smallpox, scarlet fever or diphtheria."

This health officer does not exaggerate the evils of this class of diseases, but when he confines his restrictive measures to women he is guilty of a gross injustice. There is no good reason why men, arrested for any crime, should not be subjected to an examination and dealt with the same as women, for they are, at least, equally guilty.

As for legalizing the social evil by putting any city department in charge of its regulation the experience of every community will verify the statement that such attempted regulation would and does propagate the most despicable grafting system imaginable. Any effort to regulate or check the evil should include both sexes for the sake of efficiency if not for common justice.

The Police Board of New Orleans

THE *Daily Picayune* of New Orleans, La., very justifiably comforts itself with the fact that in the new Board the city has a Police Board that is so constituted that it can perform the duties and carry on the functions which are necessary to secure the public order and protection of life and property in the great Metropolis of the South.

The present Board is composed of the Mayor and two commissioners appointed by him, their duties being fully set forth in the legislative act which created them. The individ-

ual character of the men who compose the Board is of the highest, and it is believed by the best citizens that they have the interests of the city at heart and will work earnestly and well to bring order out of chaos. The new Board is a manageable body. That which it succeeded was, according to the *Picayune,* "the most useless, incompetent and superserviceable political fungus that was ever fastened on a body politic." The law under which it had been created was changed so that the Board was taken wholly from under the control of the Mayor, its members owing no responsibility to any authority. From its actions or want of action a condition grew up that became intolerable. Its abolition is an event on which the people of New Orleans are to be heartily congratulated.

♣

St. Paul Anti-Smoke Law Valid

The State Supreme Court of Minnesota has cleared up a matter of much interest in its decision declaring valid the so-called "Smoke Ordinance" of the City of St. Paul. A test case was made in the person of the fireman of an apartment house who was arrested on complaint of the health department on the charge of permitting dense smoke to issue from the chimney of the building. He was tried in the Municipal Court and fined. The case was appealed on the ground that the ordinance under which he was arrested was void. The higher court held that the ordinance was within the valid exercise of the police power of the Municipality. It therefore affirmed the judgment of the lower court.

The decision should prove gratifying to the good citizens of St. Paul.

♣

The Billboard Nuisance in Cities

That thoughtfully edited journal, the Dayton, O., *News* expresses satisfaction that the war on the billboard nuisance goes on apace and that many cities have made great strides toward its suppression. After pointing out the improved conditions obtaining in Omaha, Seattle and Kansas City through the elimination of the unsightly billboard, the *News* says:

"Dayton is a city noted for its beauty and while many improvements may still be made, in no single direction can better results be obtained than in the elimination of the unsightly billboards, that are seen wherever a place can be secured that will enable them to greet the eyes of the people. Immodest, impertinent and ugly the sign, that will shock the nerves or in any way disturb the person's equanimity, is most conspicuous and is found staring one in the face in whatsoever direction he may turn. When considering all that the people of the Gem City are doing to beautify, adorn and make it attractive, it is certainly to be regretted that more active measures are not adopted by the officials to relieve them of this nuisance that does so much to thwart their efforts and minimize results."

It is to be hoped that the Gem City will soon be rid of its iniquity.

Editorial Comment

Municipal Conventions at St. Louis: The League of American Municipalities at East St. Louis, Oct. 4-6; the American Society of Municipal Improvements at St. Louis, Oct. 4-6. Joint sessions of these two societies will be held on the Fair Grounds on Oct. 6th. Program elsewhere in this number.

♣

Columbus, O., wants the League of American Municipalities to meet in that city next year. The League held its first meeting there in 1898 and, no doubt, many of the old members would be glad to re-visit the city.

♣

Samuel M. Jones, the "Golden Rule" Mayor of Toledo, whom all members of the League delighted to honor, will be greatly missed at the next session of the League.

♣

City Officials are often criticised by the hard-fisted taxpayer for attending municipal conventions, subscribing to municipal periodicals and otherwise spending the city's money to improve themselves for the sake of bettering their service to the city. That such criticism is absurd and unjust, any business man knows. A business manager of a daily newspaper, of our acquaintance, contemplated making extensive additions to his plant, but before doing so took the time to visit a dozen other cities of the size of his own in order to carefully inspect the daily newspaper offices and learn something. He felt that it was quite as important to learn what not to do as to "get on" to the new points in his line. No up-to-date city regrets the money its officials spend in this way, for it is realized that many thousands of dollars are saved to the taxpayers annually thereby.

♣

Mayor Jackson, of Houston, Texas, recently inaugurated ward street cleaning in his city, the work to be performed by the citizens on certain days at certain hours, the sweepings and refuse to be carted away by the city. After a trial of two weeks the system was extended so as to include the greater part of the city. The innovation has given general satisfaction. Where a city has not sufficient funds to maintain an adequate street cleaning department we can understand how supplementary efforts by the citizens would be a great benefit to the city. We feel, however, that most cities of ten thousand population and over by wisely investing in modern street cleaning machinery could keep their thoroughfares clean at comparatively little expense.

♣

Hereafter, according to the Philadelphia *Record*, that city will have competition in the bids for street cleaning, a state of affairs which has not existed for lo these many years. Mayor Weaver is given the credit for the action and the *Record* commends him for doing "a bold and public spirited thing in forcing competition in these contracts."

♣

The fact that the typhoid fever victims of Butler, Pa., will prosecute the Water Company of that city for criminal negligence in pumping polluted water into mains last winter, thus causing an epidemic and resulting in many deaths, should afford a timely warning not only to private water companies but also to cities. In the long run it is much

cheaper to pay the bills for all needed precautions than to settle for damage suits.

♣

THE Philadelphia *North American* is bewailing the fact that the Quaker City has to pay the Asphalt Trust $2.00 per square yard for the same kind of pavement it is laying for Brooklyn at $1.03. Judging from our own observations of the pavements in the two cities, it is a square deal, for Philadelphia's asphalt pavements are enough better than the Brooklyn pavements to make up for the difference in cost. The asphalt pavements in Brooklyn and New York are rotten. The varying prices for asphalt pavement reminds us of the egg market: "Fresh laid eggs, 50 cents; fresh eggs, 35 cents; eggs, 25 cents; pickled eggs, 20 cents." Philadelphia pays for a first-class asphalt pavement and gets it (?) while Brooklyn pays for a third grade and gets it.

♣

THE smooth pavement, whether of wood, bitulithic, asphalt, brick or Medina stone, is far preferable to the antiquated cobblestone or granite block. It is more than passing strange why some cities continue to lay such large quantities of the detestable granite which is so hard on the horses' feet and destructive to vehicles.

♣

A Plea for Wide Tires

MEMPHIS, TENN., August 5, 1904.

Editor MUNICIPAL JOURNAL AND ENGINEER:

I have read with great interest Mr. Alvord's excellent report on "The Street Paving and Maintenance Problem." It is hard for me to see how he could miss the solution so far, after getting so near it. He fails to show, as I believe he could have shown, just what makes the "Problem" at once so big and so easy.

The private, unofficial, traffic and transportation department of the country (probably most of us use street roads more or less) chooses to make streets and roads, and (both directly and consequently), traffic, much more expensive than they should be. The country permits the abuse and pays the double freight. Whenever we choose to stop this abuse—to put streets, roads, and the traffic over them, upon a paying basis, by *saving, rather than expending,* money on them and their use, we can make the "Problem" an easy problem and pay less freight accordingly. Very much of the gravity of the street paving and road making problem, is a matter of choice, and more still of the seriousness of the conditions confronting us as to maintenance and drainage of streets and roads is of the same bad choosing. We simply choose to make, and to keep on making traffic "heavy." Mr. Alvord, in writing of "The Ideally Paved City," actually accepts and reckons with "heavy traffic," just as if it were not a matter of choice, and so absolutely prohibitive of any ideal pavement or traffic. As long as "heavy traffic" is permitted or practiced no city or street can be ideally paved, or even well paved.

We have not in this country to-day, a single good street or road. We have some better than others—no doubt we have some as good as any to be had under present "heavy traffic"—wheel-practice, but we haven't one which might not be better for less money—which might not now be further bettered as a traffic facility (and otherwise) at less than no cost. Can they be called good when this is true of them? Is that traffic good which goes lame, and goes lamely, on "heavy-traffic"-wheels, *when everybody knows* that wider wheels would make traffic "lighter."

Mr. Alvord writes that he does "not think the narrow tire argument so effective in dealing with the city paving problem as it is in country roads." However unimportant, even if correct, the opinion may be, the fact remains that narrow tires are about the most effective means of destruction known to man, "whose chief errand is destruction."

As compared with good wheels, wide, "light-traffic"-wheels, as standard, narrow wheels are costing us about as follows:

First. They make pavements and road surfaces cost at least 50 per cent. more, by requiring, or, at any rate, getting much greater thickness. Mr. Alvord very properly objects that: "Engineers have been accustomed to providing very thick and expensive pavements in first cost with the expectation of giving them as long a life as possible under ordinary conditions of neglect." Why not say, "under present deep cultivation by 'heavy-traffic'-wheels, as a matter of choice?" If this "result" of "ordinary neglect" "has been unfavorable to the popularity of macadam"; if, "indeed, no pavement survives criticism under such circumstances," what shall we say of positive destructive practices as a matter of choice? choosing bad wheels when good wheels would do?

Second. They make the need of repairs—and result of their neglect—300 per cent., 500 per cent., or 1,000 per cent. greater. Note the very important truth that the best and easiest way to make necessary repairs is to make them largely unnecessary. Consequence of neglect should be reduced in same way.

Third. They make traffic "heavy"—hence make very many people think that they think that granite or other stone block pavements are necessary, *or even desirable.*

Fourth. They make amount of dust and mud some 300 per cent. to 1,000 per cent greater, hence cost of sprinkling, or not sprinkling, much greater. Sprinkling makes the filthiest mud known. Unnecessary dust is a needless menace to health. Also, it makes that very dust devil, the automobile, a terror indeed to all left in or near its wake.

Fifth. They make (as a result of 1, 2, 3, 4) the mileage of unimproved roads and streets greater by at least 100 per cent. of the mileage improved at such costly expense. This mileage left unimproved, from choice, must cost most outrageously more than the cost of the 50 per cent. improved under the false requirement of "heavy traffic" practice, plus all other cost of traffic over it. If not, why be so anxious to improve?

Sixth. They make mud-and-dust-making wear vehicles and pull horses much more. The cost of horse power is not proportionately increased, except where there are no grades to require excess power enough to cover the excess wear pull.

Seventh. They make noise greater by some unknown, but by no means unimportant, quantity.

There are other counts in the indictment, but these should be enough.

True! Studebaker does say: "We advocate narrow tires" '(and 1½ inch mind you)' for good roads and pavements." But does not the same authority (?) say: "The beneficial effect of wide tires is not sufficiently appreciated by turnpike and macadam road companies?" Besides, on the same page with these conflicting "conclusions" (Bulletin No. 12—Agricultural Department—Road Office), we find the statement that some one in Onondaga County, N. Y., found in a three years' test that non-tracking wide tires saved 25 per cent. of the cost of hauling on a stone road—"improved"—and a good one *after these few lonesome good wheels were put on it.*

Mr. Power then says that the roughness and ruts in this "improved" road, ruts made by narrow tires only, pulled his wide non-tracking wheels pretty hard at first, but this was the mere *temporary* or hour "effect," which Studebaker must have mistaken for the permanent or year, lack of effect, which lack of destructive effect should save more than 25 per cent. if given proper show. Carry this test out to its proper conclusion and then compare with the Studebaker test. In this connection, let us consider the other really valuable test made at Atlanta some six or seven years ago.

There the two wagons were run a number of times over the clay road made thoroughly wet. The wagon with 4-inch front wheels and 5-inch rear wheels, with axle enough longer to prevent tracking, the whole making two tracks about ten inches wide each, unmade the mud from the wetting, while the "heavy-traffic"-wheel wagon; making two tracks each two inches wide, made mud several inches deep and then pulled twice as hard as the other wagon differing only in width of wheels; or rather in width of track. (Bulletin 20—Office of Road Inquiry—Agricultural Department). To get at the full value of this test we must imagine the clay road wet again and again, also worn into dust under the cultivator wheels, remembering that, in very wet and in very dry weather, macadam and gravel roads are at best only a better class of clay roads.

Mr. S. Whinery draws a general conclusion from observation as follows: "The destructive effect of horses' feet is greater per ton of shod horse than is that of wheels per ton of load." Essentially this is incorrect, for generally we think of "destruction" as coming through holes (and ruts) all of which, practically, are made by narrow wheels.

However, whether or not Mr. Alvord or Mr. Whinery is correct, the important thing is that we are spending heavily, as a matter of choice, in the act and process of positively making streets and roads bad, and *in consequence,* hence worse than uselessly, spending as much more for repairs and renewals, for which good wheels, good vehicles, would not call. What boots it whether city or country is to be more or less benefited by best streets or roads obtained through the use of best wheels? The same wheels are used on city streets and country roads and it would be impracticable, besides being very undesirable, to make a difference. While streets may wear less in amount, the material worn is more valuable, and the wear to vehicles more important.

The simple truth is, we cannot get anywhere near the whole cost of narrow tires until after the adoption of good wheels.

We should get legislatures to fix a minimum width of at least one inch average for each 1000 pounds on four wheels—say one and one-half or two inches for 1000, and six inches for 7000 or 8000—and greater widths, where possible, should be encouraged by removal of so much tax per unit width added per ton of load.

J. M. Heiskell, M. E., C. E.

Personalities

—There is a new baby at the home of Mayor Robert H. Jeffrey, of Columbus, O.

—The funeral of Mayor John M. Rogers, of Bordentown, N. J., occurred on August 10.

—At the municipal election held in August at Kosciusko, Miss., W. H. Noah was elected Mayor.

—Judge Emmet L. Beach, of Saginaw, Mich., was elected Mayor of Point Lookout, Mich., on August 13, after an exciting contest.

—Mayor Bowles, of Springfield, O., has returned to that city after an extended tour in the West, which embraced the St. Louis Fair.

—Mayor Rich was re-elected to the mayoralty of Hattiesburg, Miss., on August 9, after an exciting but good-humored contest.

Mayor Torrance, of La Crosse, Ind., has invited the League of Wisconsin Municipalities to hold its next convention in his city.

—Announcement is made of the engagement of Mayor Frank S. Katzenbach, Jr., of Trenton, N. J., to Natalie McNeal Gruff, of Wyncote, Pa.

—Mayor Nelson, of Racine, Wis., was elected First Vice-President of the League of Wisconsin Municipalities at the recent convention of the League.

—Isaac D. Gabel was elected Mayor of Bordentown, N. J., on August 11, to succeed the late Mayor John M. Rogers. Mayor Gabel is a Democrat.

—Mayor William L. Barrett, of Belton, Ga., lost his son, Mr. George Barrett, on August 9. The death of young Mr. Barrett was due to a railroad accident.

—Mayor Herman Meyers, of Savannah, Ga., made a felicitous speech of welcome to the League of Georgia Municipalities when it held its convention recently in that city.

—Mayor Lankering, of Hoboken, N. J., has prepared recommendations to submit to the Council regarding the wiping out of swamps, which are a menace to the health of his city.

—The town of Glasgow, Mo., has insisted on keeping A. B. Southworth in the mayor's chair for eighteen years for the reason, as alleged by the citizens, that—he makes a good mayor.

—Mayor W. F. Harriman, of Appleton, Wis., made a felicitous address of welcome to the visiting members of the League of Wisconsin Municipalities at the annual conference held in his city.

—Mayor Drake, of Windsor, Canada, recently expressed the opinion that the laws of Canada are as good as those of

the United States, and he did not wish any one coming before the Council to cast reflections upon those laws.

—Mayor R. E. Allen, of Augusta, Ga., after having been in attendance on the annual convention of the Georgia League of Municipalities, returned to his desk in time to defend his administration from the attacks of a belligerent councilman.

—The League of Georgia Municipalities elected the following officers for the ensuing year: President, Hon. James R. Atwater, mayor of Thomaston; first vice-president, Hon. R. E. Allen, Mayor of Augusta; second vice-president, Hon. L. H. Chappelle, of Columbus; third vice-president, Hon. Herman Myers, Mayor of Savannah; fourth vice-president, Colonel J. M. Pace, of Covington; secretary and treasurer, Hon. Bridges Smith, Mayor of Macon.

A Fearless Mayor

MAYOR F. E. MOORES

Mayor Frank E. Moores, of Omaha, is serving the second year of his third term, having been elected first in 1897. He is a Republican, but has drawn support from the laboring classes regardless of partisan lines. He is accounted one of the shrewdest politicians and the best vote getter in the city. Prior to election as mayor he was Clerk of the District Court, the fattest political berth in Douglas County. Before that for many years Mayor Moores was general agent for the Wabash railroad in Omaha.

A certain decisive courage in fighting measures to which he is opposed and extravagant expenditures has marked his administrations, which have been, frankly, of a "wide-open" character, with equally frank insistence upon protection to the life and property of citizens. At various periods, and at the present time, this policy has been curtailed by a board of fire and police commissioners appointed by the Governor. Mayor Moores always has contended for absolute home rule in municipal affairs, and has passed through several hard-fought legal battles to establish this question, which is still, in a degree, pending, although the last Supreme Court decision was against him.

Mayor Moores served with distinction with Ohio regiments in the Civil War, retiring with the rank of captain. He was born in Cincinnati, O., in 1841, entering the railroad business at Kansas City when twenty-seven years old.

Several years ago he drew widespread attention to Omaha by giving the people of the city one or two "blue-law" Sundays, on which every business establishment of every character was closed. Not even drug stores were permitted to open. This was done in response to a violent fight being waged on the mayor on morality grounds. His rigid orders worked the desired effect, and saloons were again permitted to open on Sunday without much public protest.

In the spring of 1903 desperate attempts were made by means of a citizens' reform agitation to dislodge Mayor Moores, but he was re-elected by a plurality close to 1,000. In this fight, as well as every other he has made, he had the support of Editor Rosewater of the Omaha *Bee*.

Mayor Moores believes that the best results can be obtained in municipal government by a centralization of power in the chief executive.

Convention Dates

SEPTEMBER

The annual convention of the International Association of Fire Engineers will be held at Chattanooga, Tenn., September 14-17. Henry A. Hills, secretary, Wyoming, O.

OCTOBER

League of American Municipalities will meet in seventh annual convention at East St. Louis, Mo., October 4-6. Hon John MacVicar, secretary, Des Moines, Ia.

The American Society of Municipal Improvements will meet at St. Louis, October 4-6, at Grand View Fraternal Hotel. George W. Tillson, secretary, Municipal Building, Brooklyn, N. Y.

JANUARY, 1905

The American Public Health Association will meet at Havana, Cuba, January 2-6, 1905. Dr. Charles A. Probst, secretary, Columbus, O.

Union of Canadian Municipalities to Convene

THE fourth annual convention of the Union of Canadian Municipalities will be held at London, Ont., Canada, September 20-22. The Canadian Pacific and Grand Trunk Railways have arranged for reduced fares for persons attending the convention, which will be formally opened at 3 P. M., September 20, at the City Hall by an address of welcome by His Worship the Mayor of London, Adam Beck, Esq., first vice-president of the Province of Ontario. There will be a reply by President F. Cook, Ex-Mayor of Ottawa, who will deliver the presidential address. During the currency of the convention the delegates will be entertained by a drive around the city and a special trip to "Springbank" by electric cars, where luncheon will be served.

Free Employment Offices

FIVE years ago the State of Illinois passed a law providing for the establishment of free employment offices in cities of the first class. Immediately thereafter Chicago established three offices and in 1901 one was established in Peoria. For the fiscal year ending July 23rd, 24,432 men and boys applied for employment and 13,640 women and girls, making a total of 38,072. Of this number 32,729 secured positions, leaving 5,343 applications for employment unfilled. During the same period, 22,493 applications for male help were received and 15,361 for female help, making a total of 37,854, of which 5,125 remained unfilled. The record for the last five years shows that a total of 192,526 applications for employment were received from both sexes, of which 163,288 secured employment. During the same time there were received at the five offices 194,540 applications for help, of which 31,252 remained unfilled. The influence of these offices has been of untold value to the unfortunate laboring classes, and has been helpful in no small degree among the poorer class of workers among men and women and undoubtedly has been the means of keeping a woman from that despair which leads to an impure life. Other States, by following the example of Illinois, would undoubtedly achieve as desirable results.

MUNICIPAL CONVENTIONS AT ST. LOUIS

League of American Municipalities and the American Society of Municipal Improvements to Convene Simultaneously—May Meet at Colunbus, O., Next Year

Mayor Silas Cook, of East St. Louis, Ill., who is a vice-president of the League of American Municipalities, has received a goodly number of favorable answers to his invitation to brother mayors to attend the meeting of the League. The invitation is as follows:

The League of American Municipalities, as per arrangements at the last National Convention held in Baltimore, will meet in this city October 4th, 5th, and 6th next.

I take pleasure in extending an invitation to you and as many of your city officials as can attend the meeting of the said League, believing that this will be one of the largest and most interesting conventions that the League has ever had.

I am of the opinion that it is the intention of the officers of the League to invite the delegates to said convention to attend the Great World's Fair in St. Louis in a body on the 6th day of October.

Would be pleased to hear from you as to whether or not you will be able to attend said meeting.

The meetings are expected to be of unusual interest, as there will be the joint meeting of civic organizations on the Exposition grounds on October 6. The partial programme of the East St. Louis convention, October 4th, 5th, and joint meeting of civic organizations on Exposition grounds October 6th, is as follows:

Address—Jas. M. Head, Nashville.

Address—Mayor Silas Cook, East St. Louis.

Address—Thomas F. Donovan, Kankakee, Ill.

Mayor Samuel Jones Memorial Service.

"Refuse Destructors"—M. N. Baker, associate editor *Engineering News,* New York.

"Special Assessments"—Jas. F. Conner, Chief Clerk Board Local Improvement, Chicago.

"The Operation of a Municipal Gas Plant"—L. N. Case, Manager and Secretary Duluth Water and Light Commission.

"The Ford Franchise Law"—Hon. John Ford, New York.

"Sewage Disposal"—Morrell Vrooman, C. E., Gloversville, N. Y.

"Municipal Charters"—Hugo Grosser, City Statistician, Chicago.

"A Glimpse at the History of Municipal Progress"—Frank Parsons, Boston.

"How to Assess Real Estate"—Peter Witt, City Clerk, Cleveland, O.

"Control of Public Utilities"—Judge William H. Bailey, Des Moines.

"What Utilities Should a Municipality Own?" "What Improvements Should a City Do By Contract?" "Suppression of Epidemic Diseases"—Speakers to be named later.

Joint Session of the Societies

The program for the joint meeting so far as made up is as follows:

"The Aims and Accomplished Work of the Municipal League"—Clinton Rogers Woodruff, Secretary.

"The Civic Problem Discussed from an Improvement Point of View"—J. Horace McFarland, President American Civic Association, Harrisburg, Pa.

"The Aims and Accomplished Work of the League of American Municipalities"—Hon. J. M. Head, Nashville.

"The Aims and Accomplished Work of the Society of Municipal Improvements"—Charles Carroll Brown, Esq., Indianapolis.

Other subjects and speakers to be added.

It is more than probable that the memorial address on the late Mayor Sam Jones will be delivered by Hon. Tom Johnson, of Cleveland, O.

Some of the papers that have been promised for the meeting of the American Society of Municipal Improvements are:

"Park Development and Maintenance"—G. A. Parker, of Hartford, Conn.

"Hurtful Pollution of the Passaic River and Its Remedies"—Ernest Adam, of Newark, N. J.

"The Use of Sulphur for Sewer Pipe Joints in Wet Places"—E. S. Rankin, of Newark, N. J.

"Municipal Testing Laboratories"—W. H. Broadhurst, Brooklyn, N. Y.

It is also expected to have one or two papers on municipal asphalt plants.

Headquarters at Grand View Fraternal Hotel

The headquarters of the American Society of Municipal Improvements are to be at the Grand View Fraternal Hotel, which faces the entrance to the World's Fair at Clayton and Oakland avenues. To reach the hotel visitors are instructed to take any "Market" street car going west at Union Station. They can thus reach the hotel without transfer. They are requested to bring their baggage checks to the hotel, whereby they can have their baggage delivered promptly and save annoyance. The Grand View is nearer the Temple of Fraternity than any other hotel and is in every way convenient. In all probability some of the joint sessions of the two municipal conventions will he beld at this hotel, and most of the delegates will be guests of the house.

Hotel Rates to Members

Members of both societies will find a hearty welcome awaiting them at the Grand View Fraternal Hotel. The rates are $1 per day and upwards, on the European plan, which means a room without board. This rate is fixed on the basis that two persons will occupy one room and that each person will be charged $1, which is equivalent to $2 for one person. Special rates for suites of rooms with bath, etc. All rooms, to insure satisfaction, should be engaged as far in advance as possible, which can be done by addressing

the Grand View Fraternal Hotel, Clayton and Oakland avenues, St. Louis, Mo.

COLUMBUS WANTS NEXT MEETING OF THE LEAGUE

Mayor R. H. Jeffrey, of Columbus, O., is desirous to secure for Columbus next year's convention of the League. He points out the fact that Columbus is particularly well qualified to entertain a convention of such a character, not only because of its central location, its splendid railroad facilities, and the hospitality of the people, but also for the special reason that some of the largest and most interesting municipal works in the country are moving forward in that city at the present time.

Columbus has under process of construction the largest sewage disposal plant in the world, which will at the time the convention meets next year, be so nearly completed as to make the idea of particular interest to all municipal officers. It will probably have, as well, an experimental filtration and softening plant for testing purposes, looking to the expenditure of $1,500,000 for filtering and purifying the water supply of the city. It has practically built a new municipal electric light plant at an expense of a half million dollars, and is also building new municipal markets upon an extensive scale. Columbus is said to have the largest and most extensive market system of any city of its size in the country, which is entirely self-supporting, in that it yields sufficient revenue to take care of its own sinking fund and the expense of repair and maintenance. The workhouse is one of the largest and best equipped in the country and supports itself entirely. Columbus has now in process of construction a concrete dam in the Scioto River, over 800 feet long and 64 feet at its base, and sinks to a great depth in a solid rock foundation.

These works will be completed when the delegates who attend the convention arrive next year and will be one of the most interesting features of the kind to be found anywhere. Mayor Jeffrey feels that with these features, as well as many others, Columbus is the logical place for the next convention.

Condition of New York's Asphalt Pavements

COMPLAINTS have been made to the Merchants' Association, of New York, as to the bad condition of the asphalt pavements in various parts of the city, a partial inspection of which was recently made by the Committee on City Conditions.

In the case of the inspections first made, the depressions were tested by a straight edge and by measurement. Only those which exceeded the limits of the specifications were recorded. In the case of the later inspections no note was made of any holes except those that were notably bad.

Upon Broadway, Seventh avenue and the Boulevard, the condition of the pavement between the tracks is almost uniformly bad, very little proper pavement being observed.

The examination covered a wide area of streets, and the tabulated results are recorded under such heads as: "'Space of 40x15 feet. Pavement torn up and paving blocks put in loosely. Very bad condition;' 'Numerous depressions, in which water stands;' 'Hole 10x5 feet. Asphalt worn away to block pavement beneath. Manhole projects 2¾ inches. Has been in such condition over three months;' 'Excavation 10x5 feet below level in places. Very bad obstruction;' 'Large holes. Pavement worn away. Very bad places around manhole;' 'Entire block very bad;' 'Four big holes, 3 to 6 inches below level of surface. Only dirt bottom in holes. Pavement practically gone between tracks;' 'Many and dangerous holes, entire width of street;' 'Place is in frightful condition and very dangerous. Made worse by a few loose paving stones in holes. Been in this condition for a year or more,' etc., etc."

The committee addressed a letter to Borough President John F. Ahearn, in which it pointed out that it had found a great number of defective places in the pavement and that many of them were due to openings which had been made in the pavements for various purposes, and the failure thereafter to comply with the requirements of the law as to repaving. The letter concluded as follows:

"We feel, however, that the conditions which we bring to your attention are such as to call for reform, and if permitted to continue will reflect seriously upon the city's administration, as it is clearly the intent of the present law to clothe your department with powers sufficient to keep the streets in good condition. That they are not now kept in good condition is obvious, and we trust a cure can be found."

Mr. Ahearn stated that the Bureau of Highways had already taken active steps to correct the conditions complained of. These were found to be due to the neglect of the Asphalt Company having the contract for making repairs on behalf of the city. In the case of each opening it is the rule of the Department to notify the Repair Company having the contract for restoring the pavements. This company, it appears, has neglected to promptly make the needed repairs, having adopted a habit of postponing small repair jobs until their plant was employed in the immediate neighborhood on a larger contract of laying asphalt streets, thereby saving the company the expense of sending a repair plant to a dstant point to lay a few yards of pavement.

Very recently President Ahearn has received reports concerning defective places throughout the city, and the repair company has been ordered to make repairs forthwith. In the case of the specific complaints made by the Mechants' Association, Mr. Ahearn ordered the Chief Engineer to at once cause inspection to be made and in case the defects continue, a pre-emptory order will be sent to the repair company to repair the pavements within 48 hours. In case of their failure to do so, repairs will be made by other contractors at the expense of the derelict company.

Public Improvements in Colorada Springs

THE very name of the "City of Sunshine," which is the pseudonym for Colorado Springs, is an attraction in itself. There are, however, other qualities which indicate that it is a very enterprising little city of which Mayor Ira Harris is justly proud. The estimated population is 30,000 and the area of the city is 4,856 acres. It has an adequate water supply, a sewer of fifty-three miles; a new City Hall, Court House, Federal Building and Mining Exchange. It has eleven public and five private schools in addition to the Colorado College. There are two hospitals. The city's payroll amounts to $15,000 per month and its monthly expenses outside of the payroll are $18,000.

The Conduit System in Boston

THROUGH the courtesy of Mr. Patrick Kennedy, Commissioner of Wires for the city of Boston, there is presented herewith a valuable object lesson regarding the urgent necessity of placing underground all wires in cities now carried overhead. In his report to Mayor Patrick A. Collins, Commissioner Kennedy points out that progress in overhead as well as underground work has been difficult and necessarily slow during the winter, owing to the extreme cold and stormy weather, frost being found in some places fully five feet below the surface; when the weather conditions were favorable the several companies did what they could to meet the requirements of the wire department. The cuts which appear herewith show a section of Washington street, in Boston, before and after the removal of overhead wires. One is a reproduction of a photograph of a portion of Washington street at Roxbury street before poles and wires had been removed. Wires are seen running along the street parallel to and crossing the structure of the Boston Elevated Railway Company. The other was taken from the same point after all wires and poles had been removed.

WASHINGTON STREET, BOSTON, FROM CORNER ROXBURY STREET, 1902—SHOWING POLES AND WIRES

The total number of poles standing on the streets of Boston at the time the report was issued was 15,139. The department of wires makes a practice of having full knowledge of the existing conditions in a street before intelligently granting a permit for conduit construction. Building contractors are required to notify the department before proceeding to erect guy posts and attach derrick guy wires to same. When this has been followed no workmen have been injured by guy wires being charged with electricity, as experienced linemen are present to look after the wires of their company and render such assistance as is deemed necessary. The ring wiring system has proved a decided improvement over the old method of running open wires. Even if one of the conductors should break it could not fall and make contact with the ground or any foreign wires. A large amount of open wire has been removed and the ring wiring substituted. It is thought to be the safest construction and to offer less obstruction to the work of the firemen, as it occupies a small space compared with open wires.

The amount of wire removed by the Wire Department during the year was (in feet) 264,370; the amount removed by owners as reported was (in feet) 1,720,468. New conduits have been built in the streets prescribed by the Commissioner of Wires. One hundred and thirty-seven different streets have been opened for the purpose of building new conduits. The underground work for the year 1903 shows a total of 67,614 feet of conduit; 506,452 feet of duct; 557,419 feet of cable; 268 manholes and 895 services. The amount of tube laid during the year 1903 was 20,057. Of this 9,072 is reckoned as conduit. There were 16 distribution boxes installed. The underground electrical service of Boston shows that including that laid in 1903 there were 1,299,864 feet of conduit; 8,332,483 feet of single duct; 1,533,358 feet of cable; 5,930 manholes; 11,955 number of service connections; 81,203 feet of solid tubing; 940 distribution boxes (Edison) and 140 distribution boxes, all of the best manufacture.

Inspection of Theaters in Detroit

AN ordinance to provide for the inspection of and rendering safe places of public amusement in Detroit, Mich., contains the following provisions:

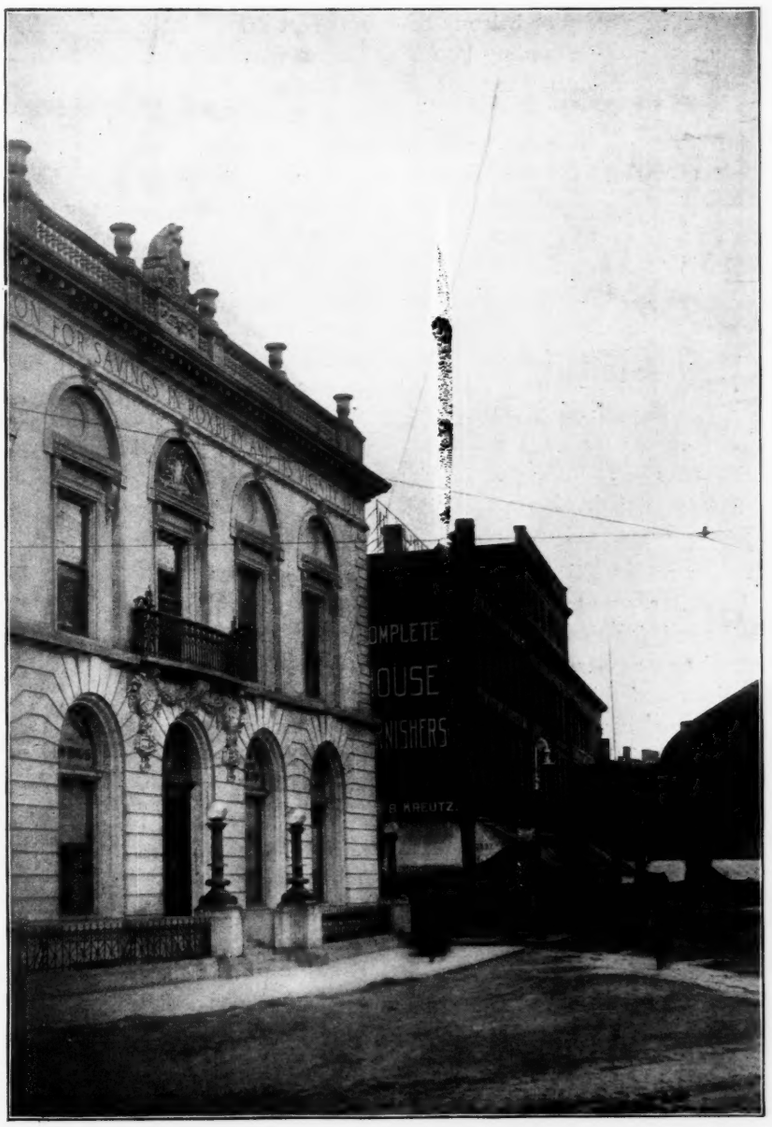
Section 1. It shall be the duty of the Board of Building Inspectors to inspect, at least once in each week, all theaters, opera houses and halls used for theatrical purposes in the

City of Detroit with reference to the condition, strength and safety thereof, for the purpose for which designed, and for the speedy and safe egress of the persons therein in case of sudden alarm or danger.

Sec. 2. Each and every theater, opera house and hall used for theatrical purposes shall be equipped with an asbestos curtain, so attached to a roller or rollers suspended across the stage or platform, operated from the stage, that the same may be instantly dropped and the stage or platform completely cut off from the assembly room of such theater, opera house or hall used for theatrical purposes, in case of fire or other alarm.

Sec. 3. Each and every such theater, opera house and hall used for theatrical purposes shall be equipped with a skylight in the roof thereof, immediately over the stage or platform therein, or with such vent or vents as the Building Inspectors may prescribe, and so constructed, equipped and maintained that such skylight, vent or vents may be immediately opened from the stage in case of fire or other alarm.

Sec. 4. Each and every stage or platform of every such theater, opera house and hall used for theatrical purposes shall be properly and sufficiently equipped with one city fire alarm box, which may be rung from such parts of the theater as the Chief of the Fire Department may direct, axes, water pipes and hose, and such number of chemical fire extinguishers as may, in the judgment of the Chief of the Fire Department, be adequate for the purposes of safety.



WASHINGTON STREET, FROM CORNER ROXBURY STREET, 1903—POLES AND WIRES REMOVED

Sec. 5. It shall be the duty of each and every lessee or manager of every such theater, opera house and hall used for theatrical purposes to have and keep in their employ and on duty during the time any such theater, opera house and hall used for theatrical purposes shall be open and occupied by an assembly of people, at least one person skilled in the use of hose and chemical fire extinguishers and other fire apparatus, to be approved by the Chief of the Fire Department. Such person shall be employed solely for the purpose of supervising and managing such fire apparatus and implements of safety, and to drill and instruct the employees thereof in the use of such fire apparatus, and to command them in case of fire or other alarm and shall not be required or permitted to perform other duties in or about such theater, opera house or hall used for theatrical purposes during the time any such theater, opera house or hall used for theatrical purposes shall be open or occupied by an assembly of people.

Sec. 6. It shall be the duty of every lessee or manager of every such theater, opera house and hall used for theatrical purposes to cause such employes thereof to be drilled at least once in each week in the use of the fire appliances herein provided for under the direction of the person referred to in the next preceding section, having the supervision and management thereof, and the Chief of the Fire Department may, at any time, order such drill by such employees and supervise the same, and it shall be the duty of said managers or lessees to keep the snow and ice clear from the fire escapes on their respective buildings.

Sec. 7. The Board of Fire Commissioners shall at least once in each week cause fire apparatus to be inspected by the Chief of the Fire Department or his assistant, and a written report of the same shall be placed on file at Fire Department Headquarters, and all electrical wire and other electrical appliances therein shall in like manner, and as frequently, be inspected and approved by the City Electrician or other competent person designated by him, which report shall be made a part of the records of the Board of Building Inspectors' Office.

Sec. 8. The doors of every such theater, opera house and hall used for theatrical purposes shall not be open for the

admission of the public thereto until such person or persons so in charge of said apparatus and other appliances for safety, shall signify in writing to the manager thereof that said safety equipments herein provided for are in good order and ready for instant operation in case of fire or other alarm, and a copy of such report shall be filed with the Board of Building Inspectors.

Sec. 9. The electric lights in use in the auditorium, on the stage, in the exits, aisles or entrances shall each be placed on a separate and distinct circuit. No theater shall sell or allow to be sold, tickets for the gallery or balcony beyond their respective seating capacity. "Standing room" tickets shall be sold only for the space back of the seats on the main floor.

Sec. 10. It shall be the duty of every lessee or manager of every such theater, opera house or hall used for theatrical purposes to cause to be printed upon every program circulated in such theater, opera house or hall used for theatrical purpose, a diagram showing the location of all exits to such theater, opera house or hall used for theatrical purposes and where such exit leads or opens to.

Sec. 11. Before a license shall be issued for the use of any opera house, theater, public hall or other place of amusement, it shall be the duty of the license collector to require a certificate from the Board of Building Inspectors that the building for which said license has been applied for is constructed and can be operated in accordance with the provisions of this ordinance. The Mayor shall have power and it shall be his duty, to refuse a license or revoke any license heretofore or hereafter granted to any such theater, opera house and hall used for theatrical purposes in case of failure or neglect of any owner, lessee or manager to comply with the provisions of this ordinance.

Sec. 12. Any person or persons, company or corporation violating any of the provisions of this ordinance, shall, upon conviction thereof, be fined not more than $100, and in the case of the conviction of any person or persons for violation thereof, such person or persons may, in addition to such fine, be imprisoned in the Detroit House of Correction for a period not exceeding six months or both such fine and imprisonment in the discretion of the Court.

Use and Waste of Water

Mr. Thomas F. Delany, superintendent of the Bureau of Water, Syracuse, N. Y., in his report to Mr. A. R. Thompson, Commissioner of Public Works of that city, calls attention to an important matter that is agitating many cities —the use and waste of water.

During seven months in which computations were made in Syracuse the average daily consumption of water was 12,254,000 gallons. During the extremely dry period in May and June the daily consumption averaged over 13,000,000 gallons and on one day reached 14,643,000 gallons. Mr. Delany states that a large amount of water is wasted and the consumption is fast reaching the limit of the capacity of the conduit line, and steps must be taken to reduce the waste to the smallest amount possible. The amount of water used by the city for public purposes such as sprinkling and flushing streets and sewers, public bath, watering troughs and fountains, public schools, engine houses, City Hall and bridges is 707,767,703 gallons, or an average per day for 365 days of 1,939,089.

Meters have been placed in all of the public schools, some of the Fire Department buildings and the City Hall and Public Library at a cost of about $2,000. The meters were placed in the schools in February. In buildings where there were motors operated by water, a separate meter was placed on such service. Records were kept for the months of March, April and May, and the wide variance in the per capita consumption of the various schools made it apparent that in some there must be great waste. The matter was brought to the attention of Mr. A. B. Blodgett, Superintendent of Schools, who took the matter up with the principals, directing them to watch the use of water carefully. After the fall term opened, the records were again kept, and they showed a large decrease in the average per capita consumption. The average daily consumption in all the schools has been reduced from 18.6 gallons to 13.1 gallons per pupil. The total amount of water used—including motor use in eight schools—has been reduced from 450,000 gallons to 380,000 gallons daily. The use of meters is to be continued in the schools as a permanent check against waste, and it is thought that the water consumption will be reduced to legitimate, necessary use.

Meters were placed on nearly all the Fire Department buildings. The use of meters affords a check against leaks. Chief John P. Quigley, of the Fire Department, will hold the captains responsible for the condition of the plumbing in their houses.

Hitherto an enormous amount of water went to waste through the watering troughs. The size of the water opening has been cut down from one-half inch to one-eighth inch. This has effected a great saving while allowing sufficient water for use. It is believed that there are too many troughs and a reduction of one-third in the number would mean a saving of about 220,000 gallons daily.

The water used for streets and sewers and for park, bridges, fountains and public bath represents a large total. The different uses of water in the city each day may be separated into ordinary metered uses (estimated), 5,532,234; ordinary schedule uses, 3,106,245; public uses, 1,939,089; elevators, 1,412,040, and organ motors, 10,392, making a total of 12,000,000 gallons.

In case of necessity the use of water for purely motive purposes could be stopped and a great reduction made in the use of water.

The Syracuse Fire Bureau

Chief John P. Quigley, of the Bureau of Fire of Syracuse, N. Y., in his report dated January 1, 1904, shows the number of fires in his city for the year to have been 314, the loss being $196,660.11. The uniformed force of the Department numbered 139 men, the salary list amounting to $13,740. The annual inspection of the Bureau of Fire was held on May 20, the whole force being turned out in full uniform, when the "Hamilton Salisbury White Medal" was presented to Assistant Chief Philip Kautz for bravery in saving the life of Theodosia Hatch on December 16, 1902. Chief Quigley in his report makes a number of recommendations for the betterment of the service.

FIRE PROTECTION ON BOARD SHIP*

Views of an Expert—Constitutional Safeguards—Equipment—Administration—Fire Extinguishers—Expense

By Edwin O. Sachs, A. Inst. M. E., A. Inst. N. A.

In presenting this paper, dealing with fire prevention on board ship, I am guided solely by the view that the subject —although of eminent importance to the safety of human life, and of very considerable interest from an economic point of view—has not yet received the attention it deserves from shipowners, shipbuilders, underwriters, or, as a matter of fact, from the public authorities controlling our maritime affairs. I am under the impression that by bringing forward the subject at this meeting my remarks may serve as a reminder to all concerned, that the time has come to give the matter that systematic and earnest attention which is being accorded to many other departments not only relating to the administration of our shipping interests and the building of new tonnage, but also tending to the comfort and safety of the passengers and crew, while lessening the ordinary economic risks of navigation.

Being an architect, as distinct from a naval architect, I naturally approach the subject entirely from the landsman's point of view. My profession makes me look upon ships much as I would upon buildings, and classify the fire risks of our great commercial fleets much as I would separate the different classes of business premises on land.

Ships used exclusively or mainly for passenger trade, ships that solely or mainly carry cargo, and ships that carry both passengers and cargo, stand in my mind as the three great divisions of commercial shipping, as seen from the fire risk point of view. The ship which serves the passenger trade, and on which passengers congregate in large numbers, stands in the same place for me as the building in which the public are allowed to assemble, be it hotel, common lodging-house, or place of public entertainment. The cargo boat may be looked upon as a building belonging to the warehouse class, whilst the boat which carries both cargo and passengers may be looked upon as a tenement building, which is partly used as a warehouse, or *vice versa,* a combination which figures largely in the building problem on shore.

As far as these three classes of tonnage are concerned, the passenger boat is of primary importance to the community at large, for the fire risk here involves the public safety. Where economic interests are involved, the cargo boat probably takes the first position, more particularly where underwriters are concerned, whilst the combined class compels both an active humane as well as an active economic interest.

In respect to the safeguards that call for consideration in these three classes of tonnage, they may be divided, as on shore, into (*a*) constructional safeguards, (*b*) safeguards in equipment, (*c*) administrative safeguards, and (*d*) safeguards in fire extinguishing. Al these forms of safeguard should be applied to our shipping, each varying in importance with the individual class of tonnage.

* Published by the British Fire Prevention Committee, London, England.

Constructional Safeguards

Design.—Regarding the constructional safeguards, I consider the primary safeguard in design to be the one which is now being generally adopted on land, namely, that of dividing the ship into the maximum number of fire-resisting compartments. This division, for the purpose of reducing possible fire risks, must be more extensive than that of the compartment system already in general use for the purpose of dividing the ship into water-tight compartments. It will be found easier to divide the ship into fire compartments that may be deemed individual fire risks, rather than into the water-tight compartments generally associated with ship-building designs. The divisional lines of the water-tight compartments will necessarily serve as a basis for the fire-resisting compartments, but the latter should be the more numerous. The horizontal division of a fire-resisting character does not bring with it any great technical difficulties. The sub-division of the hold into smaller compartments than the usual subdivisions is of little difficulty and inconvenience in the majority of cases. Having special regard to the passenger boat, there is not the slightest reason why the long flights of cabins and saloons should not have more frequent subdivision, if only by means of non-inflammable, hard-wood bulkheads, than is usually effected by water-tight doors.

The primary safeguard against spread of fire in ships of all classes will be their division into the largest number of small fire risks consistent with the work of the ship, and this number can and should far exceed the number of divisions made in order to obtain water-tight compartments.

Materials.—Turning next to the safeguards in the application of materials to the construction of vessels, I consider the reduction of combustible material to a practical minimum to be essential. For the passenger ship, however, in particular, I would go so far as to say that the reduction of the combustible material should be compulsory, and that, above all, the vast quantities of highly inflammable wooden partitions and fittings used on board our ocean greyhounds and excursion steamers should be absolutely condemned. There is not the slightest reason why wood should be used at all to the extent that it is at present, for with metal framing and the various forms of sheeting of a non-inflammable character (the component parts of which are, to a large extent, asbestos) a very considerable amount of the woodwork would, *ipso facto,* be banished, to the advantage of all concerned, for these sheetings economize space, and are excellent non-conductors where hot summer weather is met with or climatic changes are encountered.

That wood, however, will always be necessary on board ship to some considerable extent, I do not wish to dispute; but where such wood is really necessary to the comfort of passengers, why not use wood that has been impregnated so

as to make it "flame-proof," or what is more colloquially known as "non-inflammable"? In the same way as the New York Building Department requires the wood furnishings and fitments of the upper portion of any skyscraper to be of "non-inflammable" wood, and just as our own County Council requires all furnishings in theaters to be rendered and maintained "non-inflammable," so for ships used mainly or entirely for general, passenger, or excursion service, the amount of highly inflammable woodwork at present to be found should be prohibited in the interests of the safety of the passengers. No doubt proposals of this kind will be met to-day with the same scoffing and opposition as new safeguards generally met with in the first instance. As far back as 1895, I strongly advocated that "flame-proof" materials should be made compulsory in theaters, but it required the Chicago theater fire, with a loss of some six hundred human lives, to wake up our public authorities in London to the importance of this matter of non-inflammability, and it is only a few months back (February, 1904) that we find London adopting the proposals. Are we to wait until one of our ocean greyhounds, or an excursion steamer on the Thames burns, with a loss of many hundred souls, before this provision is made compulsory? Surely the burning of the excursion steamer *General Slocum* off New York City should serve as a sufficient object-lesson how rapidly the ordinary wood top-hamper of a vessel will burn when a fire gets well started. Surely, too, it would be better for the shipowner who is laying down new ships to specify of his own accord what is necessary. Otherwise, one of these days, after some great catastrophe in our midst, he may find himself confronted, not only with legislation regarding his future ships, but with retrospective requirements in this direction, and the latter will be the more awkward condition of the two to meet.

The "non-inflammability" of wood is a problem which, to my mind, has been solved commercially. I have gone into the matter most carefully, and base this finding, not only on English, but on American and Continental experience. Such tests as those before the British Fire Prevention Committee at our Testing Station, as reported upon in Publications Nos. 36 and 57, quite converted me from the somewhat skeptical attitude which I took up regarding the earlier demonstrations of the utility of impregnation. I can, however, foresee that the foremen or workmen in the shipyards may put forward all manner of excuses as to the unsuitability of treated wood for shipbuilding, for to my mind it must be slightly harder to work and require additional "elbow-grease"; but the fact remains, that the earlier difficulties have been overcome, and that both in England and in the United States wood can be treated, which is in every way perfect, will take paint, will not corrode nails, and will not contain any poisonous chemicals; and thus the more intelligent naval architect and shipyard manager will, if he so wishes, merely have to combat the ignorant prejudice of his subordinates—at the most a matter of months. Fortunately, too, the impregnation of wood, with the view of making it "flame-proof," is no longer the monopoly or specialty of the United States, where, I understand, some half-dozen firms are already undertaking work of this kind; but similar firms are now at work or starting work in Great Britain, France and Germany. Hence, suitably treated wood is now obtainable commercially on this side of the Atlantic.

What refers to woodwork on the passenger ship, refers in some degree to textiles, but not to the same extent, as it is well known that the proportion of textiles on board ship is quite minimal.

As to the cargo boat, the large amount of wood at present to be found on board is, to a great extent, quite unnecessary, and, although I will not go so far as to say that "non-inflammable" wood should be compulsory on a cargo boat, I believe it would be in the interests of shipowners to reduce the amount of wood to a minimum, and to lessen the fire risks in the crew's quarters and officers' cabins by using treated wood in these parts.

Where the difficulty really arises, however, is to find the happy medium for ships which are a combination of cargo and passenger boat. A practical compromise can be arrived at by defining the safeguards I advocate for cargo ships which have accommodation for more than a certain number of passengers.

SAFEGUARDS OF EQUIPMENT

The two forms of equipment safeguards to which a great deal more attention should be paid, are: (1) the protection of the hot steam piping, and (2) careful electric wiring.

The Steam Pipe.—Regarding the hot steam pipe, its protection in many instances is quite insufficient, particularly on what I will term the cheaper class of boat, *i. e.*, the minor passenger boat and the minor cargo boat. The result is that the hot steam pipe is frequently the cause of outbreaks of fire, afterwards attributed to spontaneous combustion or climatic conditions. I advocate that the steam pipe should have additional protection, besides its ordinary insulation covering, in the form of a wire guard in all exposed places, so that anything lying right up against it does not touch the pipe or pipe coating, *i. e.*, that there is an air space intervening.

Electric Wiring.—It would lead too far to go into the details of electric wiring, but I cannot but call attention to the fact that, as far as the electrical risk on land is concerned, the Chicago theater fire, the Metropolitan Railway fire in Paris and the great Buda Pesth warehouse fire—all within the past twelve months—are attributable in the first instance to electrical causes. It is, of course, true that many other forms of neglect combined to turn these electrical accidents into catastrophes. At Chicago, for instance, the electrical accident itself was a very minor one, but the great amount of inflammable material on the stage of that theater turned that accident into a catastrophe. I fully realize that the electrical risk is not as great as that of the open light, but the danger is a hidden one, and hence of a very treacherous character. Any scamping in the electrical installation on board ship should be made impossible, and greater supervision in this respect on board ship—and particularly on passenger vessels—is essential.

ADMINISTRATIVE SAFEGUARDS

The administrative arrangements for handling and storing cargo on board ship are by no means as perfect as they should be from the fire point of view. It depends almost

entirely on the individual initiative and good sense of some subordinate as to whether the necessary precautions are taken.

Spontaneous Combustion.—Here, again, it would lead too far to discuss the many problems of spontaneous combustion, or alleged spontaneous combustion, on board ship, for that term frequently covers a multitude of other sins. But there is no doubt that spontaneous combustion plays an important *rôle* in the annals of our ship fires, and that this spontaneous combustion is mainly due to administrative neglect. It would be well if some technical body interested in the subject, such as the British Fire Prevention Committee, were to collate the actual experience obtained of ship fires caused by spontaneous combustion, and further collate the various safeguards against spontaneous combustion in a short and practical form, for distribution among shipowners and such of their officials as have to do with the loading of vessels. The committee is at present forming an industrial section and, given the necessary funds, it has all the material at hand, and the voluntary workers, to get a matter of this kind attended to. At present, as I have said above, it depends mainly on individual initiative and on rule of thumb, as practised by some subordinate, whether the stowage has been carefully undertaken or not, from the fire point of view; and this haphazard way of dealing with an important element of danger should be stopped.

Patrols.—This question of stowage and spontaneous combustion is, of course, of primary importance to the cargo boat, or to a ship that combines cargo with passenger traffic. It is also of some importance in the passenger boat. In all classes of ships, however, I consider that there should be the safeguard of a fire patrol—as practised on land in the Liverpool warehouses, with regular inspection—more particularly in the holds and out-of-the-way corners of the ship. The additional trouble thereby involved should not be shirked. The patrol is an all-important administrative safeguard.

The patrol's work should be supplemented by an ordinary electrical fire alarm or telephone system, and in numerous cases where particularly hazardous cargoes are carried a small, reliable, automatic fire alarm, on a closed electrical circuit, will be found a useful auxiliary.

I may, of course, hear the question asked: Why all this effort? My answer is, that if life is saved by the effort of careful administration, this should recompense the shipowning community as a whole for the trouble taken. But apart from any question of human life, the bona fide fire on board ship is always a matter of considerable inconvenience and loss to the shipowner, for which no underwriting money can, as a rule, compensate him. For a passenger line, in addition, the slightest outbreak of fire generally serves as a very injurious advertisement. Besides this, there is the annual national fire waste to be considered, by no means a small factor in the economy and prosperity of the British Isles.

Rules.—Of administrative safeguards on board ship there are numerous other ones which refer to the rules for the crew and the passengers, and particularly steerage passengers. These regulations are, as a rule, carefully drafted and closely adhered to on most of the great liners sailing under the British flag, but I think that there are yet a number of safeguards that might be defined in form of rules, without causing inconvenience.

On board passenger ships one of the most common abominations, from the fire point of view, is the passenger who after "lights out" reads by candle light in his bunk, and, what is more, often goes off to sleep, leaving the candle burning. A light in the cabin after regular hours should involve immediate inspection by whoever is on patrol duty, and dangerous open lights such as these should be prohibited.

Fire Extinguishing

The arrangements for getting the men together to extinguish a fire on board a British ship, *i. e.*, the calls to fire quarters, are generally good and smartly executed, but there is not much to be said in favor of the fire service equipment. Only last year, on an ocean liner of the first order, I was absolutely astounded at the inadequacy and elementary character of the fire service equipment.

Hand-pumps, Hydrants, etc.—For the ordinary small fire on board ship nothing is more in place or more effective than the ordinary bucket and hand-pump. The next thing which should be remembered is that a hydrant, to be effective on board ship, must stand charged at a fair pressure of, say, two atmospheres, and be so placed and connected up that it can be immediately brought into action. Pumping water at high pressure is not of such importance during the first few minutes as an efficient stream at a fair pressure, immediately applied without fuss or trouble.

Steam-pumps, etc.—Steam-pumps will, of course, be found ready for action on any decent ship nowadays, but really strong and efficient manual engines should also be placed in positions where a large number of men can easily get at and efficiently handle them. These would be reliable stand-bys. The inefficient squirty manual of an antiquated type is all too common, and, I believe, still meets the requirements of our shipping authorities. Attention should be paid to matters of detail, such as good either-end couplings and good unlined canvas hose. In all ships the hand-pump and hydrant should be accorded premier importance.

Gas.—On the cargo boat, however, and on the combined boat, the fire-extinguishing equipments should compulsorily include an extinguishing plant for the application of gases suitable for fire extinguishing. This form of extinguishing is most effective, but it must not, of course, be considered as entirely replacing extinguishing by water, inasmuch as it will not always entirely extinguish the fire, but only keep it down. A fire, thus having had its back broken by the gas, still generally wants handling with water, and there are many points in a ship quite unsuitable, to my mind, for the application of gas, which is mainly intended for use in the holds.

Fire Quarters.—I need hardly say that "fire quarters" require careful thinking out and arranging to meet individual cases, and that no hard-and-fast rule can be laid down as to the number of men or their stations, except that a few men should always be kept at hand, close to the bridge, to go anywhere and do anything where special assistance is required, and that this squad of special service men stationed near the bridge should be athletic unmarried men.

Much depends on the selection of the right men for the different duties on the "fire quarters" schedule. Further, fire quarters should be frequently practised, and the great shipping lines should encourage smartness and efficiency in this direction by awarding cups or prizes for special drills, such as the rapid running out of hose, etc., after the manner of the private fire brigades on shore. It would also be of considerable benefit if the officers were encouraged to acquaint themselves with the leading principles of fire fighting, and fire tactics, and more particularly with the handling of fires occurring in special classes of goods, such as cotton, jute, tobacco, etc.

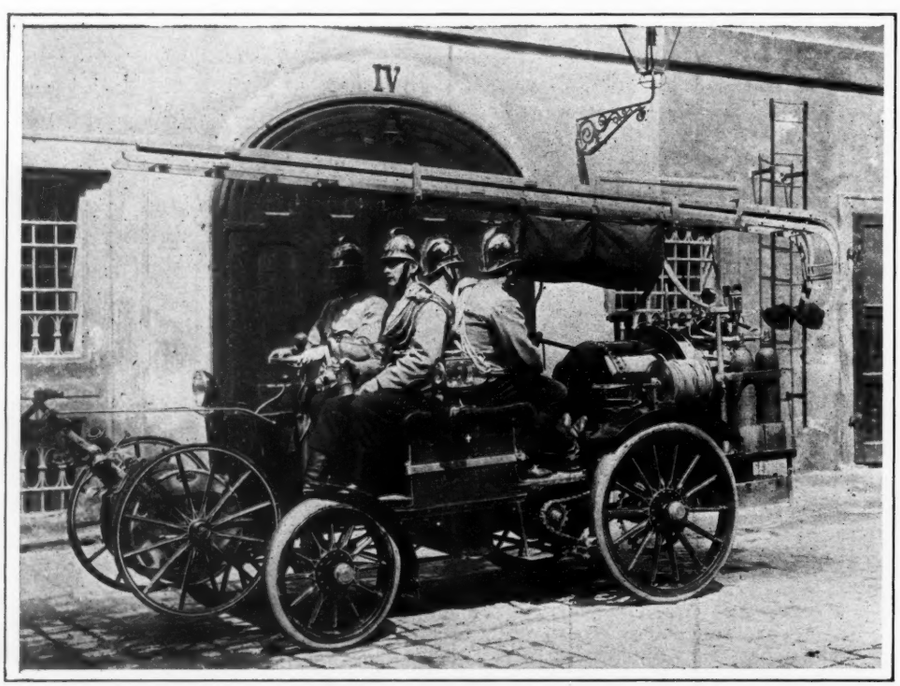
Expense

Having given my views on these various safeguards, I shall, of course, be immediately confronted with the question of expense thereby incurred. I do not think the additional expense to be considerable, but even if there be some additional capital outlay in the first instance, the loss of interest thereby involved should be partly made up by a reduction on the underwriting rates, both as to the ship and as to its cargo. The additional division into compartments is not a great expense. The application of non-inflammable materials, though at first sight an apparently heavy item, involves but a very small percentage on the total expenditure of furnishings and fitments in an up-to-date passenger ship. The expense for the administrative safeguards is minimal, and that for the fire-extinguishing equipment likewise. In fact, if only shipowners and shipbuilders would take the matter to heart, they would find that the moment they really wished to make their vessels safer from fire, they would be able to do so at a very small cost; while, of course, as long as they look upon the safeguards with disfavor, the extra expense will be described as "enormous," and they will only be applied under compulsion.

Conclusion

In conclusion, I would emphasize the fact that these remarks are only intended to serve as an outline of the principal points for consideration in this very important and much-neglected subject, and I trust it will lead to an improvement in our safeguards against fire on board ship.

That, apart from the terrible catastrophe off New York, fires on board ship constantly occur, and, what is more, occur with increasing frequency, no one will deny; and I am afraid that many a fire at sea has been hidden from the world by that terrible word "missing," to be found all too often in the shipping records. As to the past year, 1903, I would add that, according to Mr. Harold Sumner, of the Liverpool Underwriters, there were over 300 fires on record for the past twelve months, in ships of over 500 tons register. Of these 108 were serious. I append a detailed list as to their character and the tonnage involved, from which it will be seen that many large ships are included, and many of them are of the most modern types. Such figures and facts speak for themselves, and at the same time will, I trust, prevent any one from thinking that a ship's fire at sea is a rarity, and the subject of fire protection on board ship a matter of too small humane and economic importance to merit attention and systematic effort.



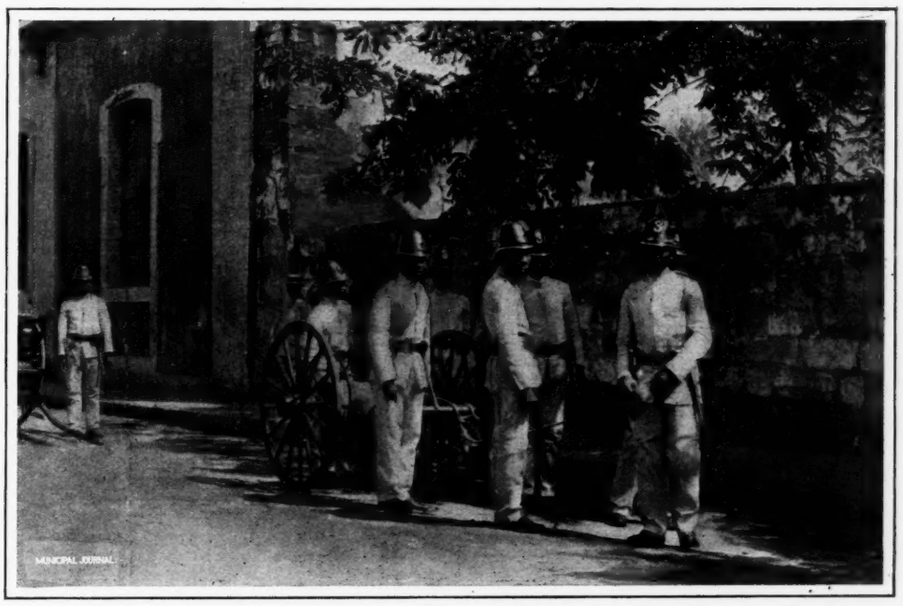
A COMBINATION CHEMICAL AND HOSE AUTOMATIC TRUCK USED IN BERLIN, GERMANY

THE FIRE CHIEFS' CONVENTION

Meeting This Month of the International Association of Fire Engineers—To Be Held at Chattanooga, Tenn., September 13-16

THE thirty-second annual convention of the International Association of Fire Engineers will be held at Chattanooga, Tenn., September 13, 14, 15 and 16.

The authorities of Cities and Towns will doubtless realize the importance of sending a chief or representative of the fire department to this convention, the object of which is to bring together men of experience in fighting fires and in view of recent disastrous conflagrations to note the improvements in machinery and methods. The exhibits at this convention will be extensive and interesting, and every effort is being made to have all the latest improvements in fire extinguishing and life saving appliances on exhibition and test.



MANILA FIREMEN TRAINED BY EX-CHIEF BONNER

A cordial invitation is extended to the Mayor, Fire Commissioners and Fire Committees of all cities and towns to attend the meeting. This invitation is signed by the following members of the Association: W. R. Joyner, Atlanta, Ga., President; Henry A. Hills, Wyoming, O., Secretary; and D. C. Lakin, Dayton, O., J. T. Mullfin, Birmingham, Ala., Fillmore Tyson, Louisville, Ky., Directors.

Reduced rates have been secured on railroads and at the hotels.

The Convention will open at the City Auditorium, Tuesday, September 13, at 11 A. M. The topics and their assignments are:

1. Will automatic sprinklers in theaters be as efficient in safeguarding the lives of audiences as emergency standpipes operated by hand? Also, the advantages of air shafts over center of stage, and steel or asbestos curtains.—Chief W. H. Musham, Chicago, Ill.

2. Can a system of auxiliary fire mains be adapted to cities of moderate size and within reasonable limit of cost?—Chief James C. Baxter, Jr., of Philadelphia, Pa.

3. Scaling ladders, their efficiency in saving life, and objections to their use in some cities.—Chief Henry R. Yates, Syracuse, N. Y

4. Best possible equipment for high buildings, shutters, elevator shafts, inside and outside stand-pipe connections.—Former Building Commissioner Perry M. Stewart, New York.

5. Notes on the Baltimore fire with demonstrations of explosions.—William McDevitt, Chief Electrical Department Fire Underwriters' Association, Philadelphia, Pa.

6. Self-propelling fire apparatus (up-to-date), its good and bad features.—Chief William T. Cheswell, Boston, Mass.

7. The comfort of men in quarters.—Chief Fillmore Tyson, Louisville, Ky.

8. Duties and responsibilities of delegates to their cities or towns and to the International Association of Fire Engineers.—Chief Fred Morrison, Watertown, N. Y.

9. Our Volunteer Fire Departments.—Chief Henry A. Hills, Wyoming, O.

For Discussion.—1. Should a standard hose thread be established by law and its immediate use made compulsory? Suggest plan.

2. In cities of from 20,000 to 30,000 population where none of the buildings are over five stories high, and the appropriation will only maintain one hook and ladder company, should the city recommend an aerial truck or an ordinary city truck?

3. The best appliances for fire protection for small towns.

4. Are special fire drills necessary to the safety of children in public schools, orphan asylums and like institutions; and what advantages, if any, are to be gained by the practice of such drills?

Many Chiefs, having attended the conventions, have expressed regret after adjournment that they had not brought before the meeting subjects they wished discussed regarding fire matters. Information on fire fighting and prevention are the fundamental principles on which our Association is founded.

It is earnestly desired that each Chief attending the conventions present any question they desire discussed. Thus they may open a debate that will be of deep interest to all departments of the country.

Headquarters will be at Read House, European plan. rooms from $1 to $3 per day. Other hotels: Southern (American), $2 to $3 per day; Lookout Inn (American), $2 to $4 per day; Stag Hotel, $2 per day; Northern, $1.50 per day; Williams, rooms 50 cents each.

The following invitation has been issued to exhibitors:

The Board of Public Safety of the City of Chattanooga, Tenn., most respectfully invite you to attend the thirty-second annual convention of the International Association of Fire Engineers. The meetings will be held in the city Auditorium, which has a seating capacity of 5,000 people. Directly under this we have a large room for the display of manufactured articles of all kinds, and contiguous to this room there is ample space for the exhibition of large pieces of apparatus. Space for the display of these exhibits will be furnished free of charge.

We, therefore, most earnestly request that you be present and make a display of your valuable implements, in order that the knowledge of improved methods of fighting fires may be more generally diffused throughout the country.

ONE OF THE COMPANIES OF THE AUCKLAND, NEW ZEALAND, FIRE BRIGADE

The following are the schedules, New York to Chattanooga via the different routes:

First route.—"Washington and Chattanooga Limited."

This is the short line via Washington and Lynchburg with through sleeper and dining car service from New York. This train leaves New York 3.25 P. M. daily, arriving at Chattanooga the next afternoon at 5.50 P. M. Parties leaving on this train September 11 or 12 will arrive in Chattanooga in time for the opening of the convention. The fare by this route is one fare from Washington plus 25 cents, viz.: $17.75. This would make the round trip from New York to Chattanooga ($17.75 plus the fare New York to Washington, $10.00) $27.75.

Second route.—"Shenandoah Valley Route."

Leave New York 5.55 P. M., arriving at Luray 4.09 A. M. Parties can remain in the sleeper until 6.30 A. M.. Carriages will then take them to the Mansion Inn for breakfast, and afterwards to visit the wonderful caverns of Luray. Leave Luray 10.45 A. M., arriving at Chattanooga 7.50 A. M. This schedule can easily be made by leaving New York Sunday, September 11, arriving at Chattanooga in time for the opening of the convention. Round trip rate, $27.75.

Third route.—"Going via Shenandoah Valley and returning Old Dominion steamer."

This rate is $31.45, including meals and berth on steamer.

Fourth route.—"Going via Old Dominion steamer to Norfolk, thence all rail, returning same route."

Parties would leave New York 3 P. M., arriving at Norfolk the next morning at 11 A. M., leaving Norfolk 7.40 P. M., arriving at Chattanooga 5.50 P. M. This schedule would allow parties to visit Soldiers' Home at Hampton, Fort Monroe and other places of interest in the neighborhood of Old Point Comfort. The rate would be $27.75, including meals and berth on Old Dominion steamer. The sleeping car rate New York to Chattanooga is $5.50 in each direction. Tickets New York to Washington are good for eleven days from date of sale. Tickets from Washington, Hagerstown or Old Dominion can be extended to September 30 upon payment of 50 cents with special agent not earlier than September 11 or later than 20th, between 8 A. M. and 6 P. M.

The Southeastern Passenger Association have granted a one first-class fare plus twenty-five (25) cents for round trip (minimum rate, 50 cents) from all points in the territory south of Ohio and Potomac and east of the Mississippi rivers (the 25 cents included in the rate to be retained by the lines selling the tickets).

Tickets will be sold September 11 and 12, 1904, with final limit September 20, 1904.

Original purchasers of tickets sold for this occasion may secure an extension of the final limit by personally depositing their tickets with Joseph Richardson, special agent, Chattanooga, Tenn., between the hours of 8 A. M. and 6 P. M., not earlier than September 11, 1904, nor later than September 20, 1904, and upon payment of fifty (50) cents per ticket at time of deposit.

The New England Passenger Association, Trunk Line, Central Passenger Association and Western Passenger Association have granted a one and one-third fare on the certificate plan to those attending the Chattanooga Convention.

The trans-Continental Passenger Association has granted a reduced rate to the St. Louis Exposition. From St. Louis a rate of one fare plus 25 cents for round trip.

The following are some of the instructions issued by the Railroad Associations:

A reduction of fare and one-third, on the certificate plan, has been secured for those attending the meeting.

The following directions are submitted for your guidance:

1. Tickets at full fare for the going journey may be secured within three days (exclusive of Sunday) prior to and during the first three days of the meeting. The advertised dates of the meeting are from September 13 to 16, conse-

quently you can obtain your ticket not earlier than September 9, nor later than September 15 Be sure that, when purchasing your going ticket, you request a certificate. *Do not make the mistake of asking for a receipt.*

2. Present yourself at the railroad station for ticket and certificate at least 30 minutes before departure of train.

3. Certificates are not kept at all stations. If you inquire at your station you will find out whether certificates and through tickets can be obtained to place of meeting. If not, agents will inform you at what station they can be obtained. You can purchase a local ticket thence, and there take up a certificate and through ticket.

4. On your arrival at the convention present your ticket to the secretary.

5. So as to prevent disappointment, it must be understood that the reduction on return journey is not guaranteed, but is contingent on an attendance of not less than 100 persons holding certificates.

6. If the necessary mimimum is in attendance, and your certificate is duly validated, you will be entitled to a continuous passage ticket to your destination by the route over which you make your going journey, at one-third the limited fare.

The secretary will have his headquarters during the convention at the Read House.

The Trunk Line Association is granting a one and one-third fare rate to delegates to the convention. This is on the certificate plan. The Southeastern Association (Southern States) has granted a round trip for one fare. Both will give an extension till September 30 to those desiring to attend the St. Louis Exposition.

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Fire and Police Personals

—Chief Benoit, of the Montreal Fire Department, is much incensed over the raising of insurance rates by the underwriters of that city.

—A movement is on foot to place Chief of Police John W. Ball, of Atlanta, Ga., in almost absolute control of the department.

—Fire Chief O. G. Marjenhoff, of Charleston, S. C., was recently thrown from his buggy and painfully injured. His driver was seriously hurt.

—Fire Chief W. W. Tobin, of San Antonio, Tex., while fighting a fire in that city recently, fell twenty feet through the roof of the burning building to the floor, severely injuring his leg.

—Deputy Chief Thomas Lally, in command of the Brooklyn section of the New York Department, is planning sweeping improvements in the fire department in that and Queens Borough.

—Fred J. Zimmerman, a heroic fire fighter, who once risked his life to save a horse, and who was badly injured in the North German Lloyd pier fire in June, 1900, died in Hoboken, N. J., on August 9.

—Federico G. Morales, an officer of the Havana, Cuba, Fire Department, delivered an address at St. Louis, recently, on "Fraternity Among Firemen of the New World." Mr. Morales is making a tour of American Cities.

—Chief of Police Charles Scheck, of Sheboygan, Wis., had his life seriously endangered recently as the result of a yawn. In performing this natural act he broke a muscle at the back of the neck, which completely disabled him.

—Chief of Police Atwood Scott Nixon, of Merrimac, Mass., died at his home in that city on July 28. He had been operated upon for appendicitis, but was unable to survive the shock. He was highly respected and widely known.

—Former Patrolman John Tierney, of East Newark, N. J., has been appointed Chief of Police of that city as a reward for long and faithful service in the department. Mr. Tierney is a handsome and active man, thirty-seven years of age.

—Fire Chief Samuel A. Snagg, of Waterbury, Conn., recently obtained an increase of salary in a very ingenious manner. He resigned the day previous to the increase going into effect and was appointed the following day at the new salary.

—John J. Mason, Chief of Police of Memphis, Tenn., has been honored by the International Association of Chiefs of Police by being appointed a member of the committee on Resolutions of the Association. Chief Mason was recently exonerated by the Police Commissioners from certain vague charges, the Mayor refusing to accept his tendered resignation.

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Montreal Fire Brigade Pensions

In the Fire Department of Montreal, there is some unrest over a proposition which has been made in the Fire Committee that those who have seen twenty-five years' service shall be pensioned off. If such a project should carry, many of the best known captains, sub-chiefs, etc., would have to retire from active service.

When a member of the brigade retires after twenty-five years' service, he is entitled to receive each year during his lifetime half the amount of the yearly salary he was receiving from the city at the time of his retirement.

The Chief, who receives a salary of $3,500 a year, would be entitled to a pension of $1,750, the sub-chiefs, $800, the captains $500, and the foremen, $350.

The only revenue the society has, with the exception of subscriptions from citizens, is the 3 per cent. on the salaries of the members of the brigade.

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Fire Insurance in Canada

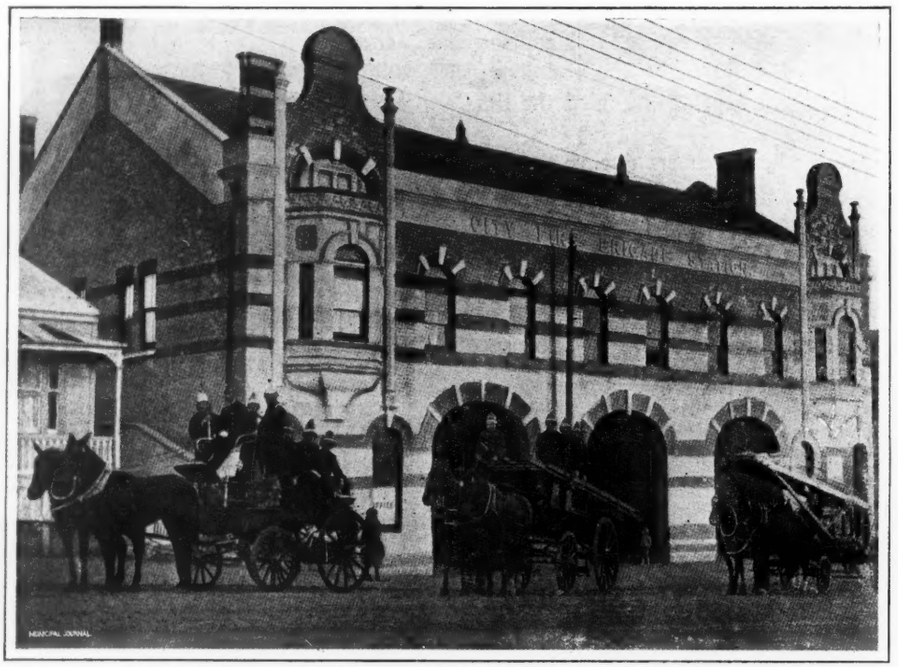
Several British cities, within the past five years, have established a co-operative insurance association run entirely at the expense of the municipalities. Thus far the working of the municipal fire insurance has been satisfactory, so much so that it has led to the formation of similar associations elsewhere in British possessions. The latest Province to follow the example of the mother country is found in Canada. During the recent annual meeting of the Nova Scotia Manufacturers' Association it was announced that measures were being taken to establish a department of insurance which would furnish fire insurance at cost to members. The annual income of the fire insurance companies in Canada is $4,000,000, of which amount more than 35 per cent. is paid in dividends and agents' salaries. It is believed that even a larger per cent. will be saved by the co-operation of the municipalities.

Fire Pension Fund for Scranton

AN ordinance was lately introduced in the Common Council of Scranton, Pa., creating a firemen's pension and benefit fund, and providing for the appointment of a commission to have control of it.

The ordinance provides that the fund shall consist of the State tax on foreign fire insurance companies, which is annually turned over to the city treasurer, together with all bequests, legacies, gifts or donations which may be received by the bureau of fire. Only the members of the regular, full paid uniform force shall be entitled to its benefits, though bunk and call men may participate therein, providing they receive injuries or contract illness while in attendance at a fire.

The fund is to be under the control of a commission of five, one of whom shall be the director of public safety. Two others shall be active members of the bureau, and the remaining two shall be citizens holding no other office under the municipal government. They shall be appointed by the mayor, subject to confirmation by Select Council, and shall serve for five years. The secretary and treasurer shall receive $100 a year.



UP-TO-DATE FIRE APPLIANCES AT HEADQUARTERS OF THE AUCKLAND, AUSTRALIA, FIRE BRIGADE

Firemen injured or contracting illness while at a fire are to receive full pay and medical attendance for not longer than a year. For injuries received while on duty other than attendance at a fire, they are to be allowed fifty per cent. of their pay for not more than six months.

Widows of firemen dying in the service are to receive $20 a month as long as they remain single. Children of such firemen, under 16 years old, are to receive $6 a month until they reach that age.

Any member of the bureau shall be allowed to retire on half pay at the end of thirty years' continuous service, but any fireman may be retired on half pay at his own request, when he reaches the age of 60 years. The ordinance provides, however, that hereafter no man shall be appointed a fireman who is over 30 years of age, except such call and bunk men as shall be in the service at the time of the approval by the mayor.

The last section of the ordinance provides that one per cent. of the monthly salary of every member of the bureau of fire shall be deducted and transferred to the pension fund.

The amount received from the State, yearly, is about $3,000. The Firemen's Relief Association, representing old volunteer firemen, formerly had control of this money and is at present seeking to recover in court some $9,000 of it, which was received in the years 1901, 1902 and 1903. Last year the old ordinance appropriating this money to the use of the association was repealed, so that there is no question as to the city's absolute title to the money which has been received this year.

Increase in Fires at the Capital

THE report of Chief Engineer William T. Belt, of the District of Columbia Fire Department, to the District Commissioners, contains considerable information. Among other things it is noted that the losses from fire during the past year were greater than for the fiscal year 1903, the number of claims responded to by the department being larger than for any year in the history of the department. Chief Belt says:

"Scarcely ever in the history of the country have there been recorded in one year so many calamities from fire as have occurred during the past twelve months. There has been an unusually large number of disasters of exceeding magnitude, many of them startling in their frightful destruction of life and property, and as would be anticipated from the current reports of immense conflagrations, the annual reports of the fire departments of many of the large cities throughout the country will show enormous increases in losses from fire over the losses of the preceding years. The records of fatalities and devastation of property, caused by the fire during the fiscal year 1904, will be notable in the fire annals of the country.

"While the losses from fire in the District of Columbia during the past twelve months were greater than for the preceding year, yet Washington has been particularly fortunate in being spared from any great holocaust of fire disaster, in which there were appalling fatalities or inordinate destruction of property, such as have visited other great cities of the United States during the past twelve months."

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

In *Getting Acquainted with the Trees,* M. J. Horace McFarland has given to the American reader a very welcome book, written in a homely and common-sense way, and all the more readable because it is intended for lay consumption and is not weighted with that scientific botany which is to be found elsewhere. The author's desire is to pass on some of the benefit that has come into his own life from this awakened interest in the trees, which he says are provided by the Creator for the resting of tired brains and the healing of ruffled spirits, as well as for utility.

Mr. McFarland points out the value of intelligent tree planting in cities. In Washington, he says, where trees are planted by design and not at random, there are whole avenues of tulip trees. It was his good fortune in May to drive between these lines of strong and shapely young trees just when they were in full bloom. Their appearance was striking and elegant. Sometime, says the author, other municipalties will learn wisdom from the example set in Washington, and we may expect to see some variety in our street trees now monotonously confined for the most part to the maples, poplars and a few good trees that would be more valued if interspersed with other equally good trees of different character. There are a number of such trees that do admirably for street planting which ought to be better known and more freely used. Cloth, pp. 241. Price, $1.75 net; postage, 15 cents.

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Details of Bridge Construction is the title of an important work by Frank W. Skinner, M. Am. Soc. C. E., consulting engineer and lecturer on field engineering at Cornell University. In this book the author expresses his purpose to present in types and details of bridge construction the development of advanced practice and its standard details, to illustrate the classes of structures adapted to different conditions, show some of the characteristic differences between American and foreign design and illustrate some primitive or obsolete construction, besides recording important and well-known examples so as to have their principal data easily accessible. The first consideration in the selection and preparation of data has been in every case to show clearly the special and important features and give only what is essential to the design and present the requirements, conditions and methods involved in the construction and erection of the work.

The list of structures described in the work is not complete, and the classification is not absolute, but they suffice to illustrate different types and show a wide range of practice in details. The bridges have been arranged in order and grouped in classes, and the descriptions are in most cases supplemented by specific references to any more extended articles which have been published about them in technical journals or professional papers, and may be consulted in libraries for additional data in special cases. Cloth, pp. 294. Price, $3 net; postage, 15 cents.

♣

The Sociology of a New York City Block is one of the studies edited by the Faculty of Political Science of Columbia University, and is written by Thomas Jesse Jones, B. D., Ph. D. The writer has at different times been engaged as a visitor for a church, for a settlement, and for an organization that searched independently for facts concerning life in the tenement districts, and he has found that the information gained in the first two instances too often contradicted that gained in the third, while he had every reason to believe that facts gained in the third were true. New York: Columbia University Press.

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The Louisiana Purchase Exposition has published a brochure on the Philippine Exposition, which is a part of the great Fair and which will prove of interest to all students of ethnology.

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Periodicals

Shutters and Other Devices for Protection Against Exposure Fires, by John R. Freeman. *Engineering News,* New York, July 14, 1904.

Some Observations on Street Pavements II. *A Cheap Pavement,* by S. Whinery, M. Am. Soc. C. E. *Engineering News,* New York, July 21, 1904.

A Proposed Test for Detecting Brittleness in Structural Steel, by J. P. Snow, M. Am. Soc. C. E. *Engineering News,* New York, July 28, 1904.

Municipal Transport Problems. The Engineering Magazine, New York, July, 1904.

The Berlin Combined Elevated and Underground Railway, by Paul Möller. *The Engineering Magazine,* New York, August, 1904.

The Constitution of Portland Cement from a Physico-Chemical Standpoint, by Clifford Richardson. *Engineering News,* New York, August 11, 1904.

Station Meters (Gas), by Donald McDonald. *Progressive Age,* New York, August 15, 1904.

Something About Water Rates, by William L. Cameron. *Fire and Water Engineering,* New York, August 13, 1904.

Station Meters, by Donald McDonald. *Progressive Age,* New York, August 15, 1904.

The Relation of Telephone Traffic to Efficient Service, by Howard S. Knowlton. *Electrical World and Engineer,* New York, August 13, 1904.

Some Notes on the Cost of Cinders for Sewage Filter Beds, by Ernest McCullough, C. E. *Engineering News,* New York, August 18, 1904.

The Journal of the Franklin Institute for August contains, among much other interesting matter, an article on the Stor-

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

age Battery as applied to Electric Railways, by W. E. Winship, in which he points out that within the last few years there has been a decided change in the attitude generally taken as to the advantages and advisability of storage battery installations. There is also a report of the committee on Science and the Arts on Ferrell's Apparatus and Process for Fireproofing Wood and a report on Sprague's Multiple-Unit System of Electric Traction. Per year, $5; per month, 50 cents.

The World's Work for September contains among other important matter, an article by George Iles on the Possible Exhibits of Model Homes. The picturesque character of the late "Golden Rule" Jones, of Toledo, is the subject of a sketch by Brand Whitlock.

The Index to the *Transactions and Journal* of the New England Water Works Association has been published. It brings its subject matter up to December, 1903, inclusive.

No. 81 of the publications of the British Fire Prevention Committee treats of "The Fire at the Iroquois Theater, Chicago." It comprises a descriptive paper by Edwin O. Sachs; the new theater regulations at Chicago; the verdict at the inquest; with some constructional particulars, by the National Fire Association, U. S. A., and an introductory note by the executive. The pamphlet is profusefuly illustrated.

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Municipal Documents Received

We have received the thirty-first annual report of the Water Board and also the annual report of the Fire Department of Lowell, Mass., for 1903.

The Auditor of Hannibal, Mo., has kindly sent us his report of the city for the year ending May 31, 1903.

The Mayor's annual message of Council Bluffs, Ia., has been received.

Hon. D. R. Anthony, Jr., Mayor of Leavenworth, Kan., has favored us with his first annual message, together with the reports of the city officials, for the fiscal year ending March 31, 1904.

Herman Meminger, Chief Engineer, has kindly remembered us with the annual report of the Fire Department of Milwaukee, Wis., for the year 1903.

We are in receipt of the Mayor's annual message and the annual reports of the officials of Gloversville, N. Y., for 1903.

We are indebted to C. F. Lawton, Superintendent of Streets, for his annual report, for 1903, of the streets of New Bedford, Mass.

The General Manager's report for the year ending May 31, 1903, of the Tramways Corporation of Glasgow, Scotland, is at hand.

We have received from San Francisco, Cal., the reports of the Board of Public Works and the sub-departments for the fiscal years 1901 to 1903.

The reports have been received of the Electric Supply Committee, Health Officer and City Surveyor of Melbourne, Australia, for 1903.

The twenty-seventh annual report of the State Board of Health of New Jersey has been received.

The 1903 annual reports of Massillon, O., are at hand.

The 1903 annual reports of Somersville, Mass., have been sent us.

The annual reports of Ogdensburg, N. Y., for 1903, have been received.

The annual report for 1903 of the Board of Street and Water Commissioners of Newark, N. J., has been received, with the compliments of M. R. Sherrerd, Engineer of Department of Water.

We note the receipt of the Mayor's message and the municipal reports of Portland, Ore., for 1903.

The annual report of the Board of Public Works of Lynn, Mass., for 1903, has been received.

The report of the Special Committee of the Atlantic City, N. J., Board of Trade on a high pressure salt water main and pumping station has been sent us.

The annual report of Ansonia, Conn., for 1903, has been duly received.

The 1903 official reports of Augusta, Ga., have been mailed to us.

The annual report of the City Clerk of Cumberland, Md., for the year ending May 1, 1904, has been received by us.

We are in receipt of the 1903 annual report of the Controller of Detroit, Mich.

The annual reports of the Fort Wayne, Ind., city officials for 1902 have been received.

We have received the fourth annual report of the Water Department of Public Works, of Syracuse, N. Y., for 1903.

Charles A. Miller, City Clerk of Harrisburg, Pa., has sent us a 1904 Councilmanic Directory.

A copy of the Superintendent's annual report for 1903 of the Muncie, Ind., Electric Light Department has been received.

We are indebted to R. C. P. Coggeshall, Superintendent of Water Works of New Bedford, Mass., for the thirty-fourth annual report of the Water Board.

The Mayor's annual message and the annual reports of the city officials of Houston, Tex., for 1903, have been mailed to us.

We have received the second annual report of the Civic Improvement League of St. Louis, Mo., dated March, 1904.

A copy of the Mayor's address and the municipal reports of Belfast, Me., for 1903-4 has been mailed to us.

The Board of Park Commissioners of St. Paul, Minn., have sent us their attractive report for 1903.

We have received the fifty-third annual report of the Bureau of Water of Albany, N. Y., for 1903.

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—The late Fire Chief John F. Mitinger, of Greenburg, Pa., former president of the State Association, who died on August 1, made a provision in his will, leaving money to each of the three Greenburg fire companies.

—At a recent meeting of the Fire Commissioners of San Francisco, Cal., a high tribute was paid by Acting Chief Dougherty to the heroism of James Coleman, Claude Brownell, William Sawyer, John Hannan and E. Rappenstin for saving lives at the risk of their own.

STEEL TRACK FOR PUBLIC HIGHWAYS

Advocated by Hon. Martin Dodge, Director of Public Road Inquiries, and Other Well-Known Road Builders—How the Road Is Built

THE importance of good roads is no longer viewed with indifference, but on the contrary, is everywhere recognized as an imperative factor in our national prosperity. When it is remembered that 95 per cent. of the nation's products are transported over the public highways, the relative value of good roads will be better appreciated.

The latest type of public highway is known as the "Steel Track Highway." As long ago as the Omaha Trans-Mississippi Exposition, the Hon. Martin Dodge had an experimental track laid on the grounds by the Government. To quote from his report on the experiment: "The three great advantages sought in a steel track wagon road, are found in this new roadway, demonstrating:—

1.—"That the steel track wagon road can be built without greater cost in most cases, and probably with less cost in many cases, than any other hard and durable road.

2.—"That it will last many times as long as any known material for road purposes, and with much less repair.

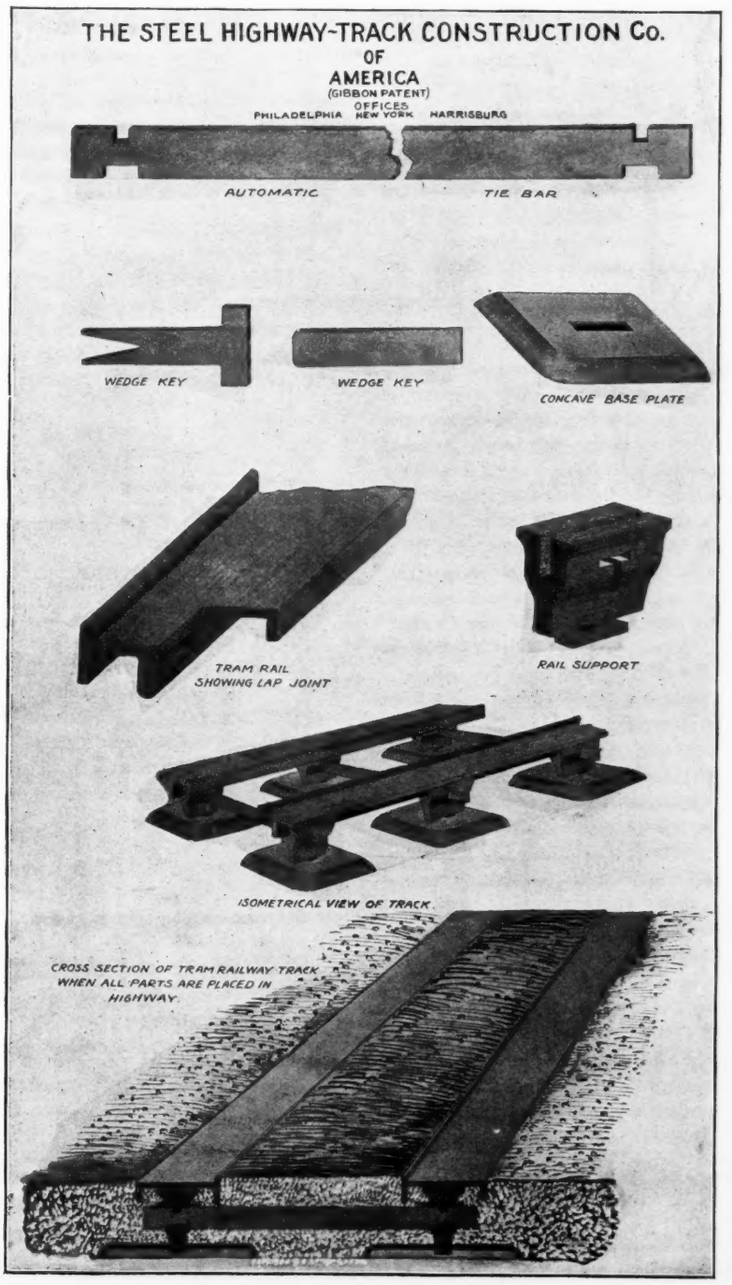
3.—"That the power required to move a vehicle over the steel track road is only a fraction of the power required to move the same vehicle over any other kind of road."

This was among the first experiments of the kind ever tried, but since that date others have entered the field and improved what was then demonstrated to be of such great value. For example, the steel track road referred to in this article was designed and perfected by Mr. Thomas H. Gibbon, an eminent civil engineer and inventor. This system, as shown by the accompanying illustration, contains but five distinct parts: the base-plate, rail-support, tie-bar, tram-rail and wedge-key.

The advocacy of a steel track on our public highways is also to protect the vital parts of the road bed, that part of the surface that must bear the grinding of the heavy wheels, to minimize the expense of maintenance, to provide an effective, reliable, permanent and smooth construction, affording the farmer means to draw greater loads at greater speed and with less power; also giving a smoother, safer, and more lasting path, free from dust and mud, for the automobile, bicycle and vehicles of various kinds to travel upon.

These objects are attained by means of the construction as illustrated:

1.—Base-plate (pressed steel) is designed to give ample support to the track. On the face a rectangular square opening is formed to receive the lug of the rail support. The lug, after passing through the opening, is turned one-quarter round, which automatically locks them together, and when combined makes a rail support of ample bearing surface for the support of the track without cross ties.



2.—The transverse tie-rods are notched near each end to the gauge required and after passing through the mortises in the rail support, accurately gauge the track and prevent spreading and creeping thereof.

3.—The face of the tram-rail upon which the vehicles run is 6½ in. in width and 32 feet in length. The rail has along its inner edge a longitudinal upright pendant or flange ⅜ of an inch in height designed to give greater vertical strength to the rail, and to assist the wheel to keep on the face thereof. The inner downward pendant is also designed to increase the vertical strength, as is also the downward pendant, on the outer edge. The main or center downward pendant, which is mortised at intervals to receive the wedge-key, is designed to engage in the groove of the rail support and to give the necessary vertical and lateral strength needed under any conditions.

4.—The wedge-key passes through a mortise in the rail support and tram-rail and rests upon the transverse tie-rod, holding the same in position, and locking all parts together. The mortise in the tram-rail is of such dimensions that contraction and expansion under climatic changes is permissible, without loosening or affecting the wedge-key, leaving the system rigid and compact at all times.

The isometrical view of the track here shows all the parts assembled, and how to lay the metallic highway.

1.—Dig longitudinal parallel trenches about 12 inches deep and 15 inches wide.

2.—Place rail support on concave base plate.

3.—Place base plate in trenches 8 feet apart, C to C first placing broken stone or coarse gravel beneath the same if thought advisable, although in most cases this is not necessary.

4.—Pass tie-rods through mortises in the rail support. This operation will gauge the track.

5.—Place rail in grooves of rail support.

6.—Drive wedge-keys through mortises in rail support and tram-rail. This operation locks all parts together.

7.—Fill trenches and between the rails, and three feet, more or less, as desired, outside of each rail with broken stone or coarse gravel and roll solid.

8.—Keep your ditches deep and clean, and you will have a track permanent, smooth in character, and ever true to alignment, grade and gauge.

A New Street Cleaning Cart

The latest thing in the way of street cleaning appliances is the small cart illustrated herewith. It was patented by Mr. R. D. Wirt, of the Wirt & Knox Manufacturing Company, Philadelphia, Pa., and the patent granted on April 26, 1904.

As will be seen, the construction is different than anything else in the market. The frame is made of tubular steel and forms a fender on the outer side of the wheels. The platform is of malleable iron, the back part of which rests on a steel drop axle and the front on a steel axle connecting the lower ends of the frame. It is so constructed that either a can or a sack may be used for collecting the dirt, the support for which is made of spring steel and needs no adjustment for either the use of can or sack. The most important feature is the inner and outer bearing on the axle. This not only adds greater strength and rigidity to the cart, but prevents the destruction of the wheels and spindles in crowded thoroughfares when there is danger of colliding with heavier vehicles.

The two small wheels in front are entirely out of the way of the operator in manipulating the cart and yet aid materially in getting the cart over curbs and other obstacles, at the same time holding the platform in position when the cart is at rest. The large wheels are thirty inches in diameter, constructed of either wood or steel as desired. The above cut shows the cart fitted out with Sarven wheels.

The cart is light in weight, neat in appearance, well made, strong and durable.

Although the patent on this cart was granted as late as the 26th of April, it has entered the field successfully. For instance, on the 5th of May, the Company submitted a sample, with prices in competition with others, to the Street Cleaning Department of New York City, and was awarded the contract for 300 of these carts, which have already been shipped and are now in use on the streets of New York and Brooklyn. The company considers this a merited endorsement of its new invention.

Not to Lowest Bidder

It is an encouraging sign of progress when the officials of any municipality, after careful investigation, award a contract for equipment or supplies to some other than the lowest bidder. An interesting instance of this businesslike practice occurred in connection with the purchase of two new fire engines for the city of Washington. The Commissioners of the District of Columbia advertised for bids and several were received, the lowest of which was that of the Nott Fire Engine Company, of Minneapolis, but notwithstanding the fact that the next highest bidder, the American La France Fire Engine Company, of Elmira, N. Y., charged twelve hundred dollars more, the latter company received the order.

It is reported, however, that before this decision was reached, the district officials tested one of the Nott engines. After the test the engine was taken apart and each piece of the machinery carefully inspected by the chief machinist of the fire department, who, in reporting on the test of the engine and his examination of the machinery, stated that the engine worked splendidly, but that in his opinion the boiler, owing to its style of construction, would not stand traveling over rough streets, and for that reason he declined to recommend the purchase of the Nott engine. As the La France engine is one of the oldest in the country, and has stood the practical test of service for many years, there was no question raised about its reliability, and, therefore, the contract was awarded to the La France Company.

A Silent Pilot

Nothing helps so much in the enjoyment of your vacation as a good map. It shows you the streams and lakes where you can fish, the mountains you can climb, the places of interest you can visit and the roads you can wheel or tramp. The Lackawanna Railroad has just issued a set of colored maps on a large scale, showing the territory reached by its lines in New York, New Jersey and Pennsylvania. These maps give every highway, postoffice, trolley line and railroad and are so bound that they can be conveniently carried in the pocket. They are invaluable to automobile tourists and travelers and should be owned by every one who wishes to be informed on the geography of these three States. The entire set in a neat cover may be had by sending ten cents in stamps to T. W. Lee, General Passenger Agent, Lackawanna Railroad, New York City. The edition is limited; write to-day.

Items of Interest About the Trade

—The city of Winnipeg, Manitoba, recently purchased from the C. O. Bartlett & Snow Company, Cleveland, Ohio, one four-compartment direct-heat rotary dryer, having a capacity of 100 tons of sand a day.

—The Buffalo Clay Manufacturing Company, of Buffalo, N. Y., has very recently made extensive additions to its plant. Heretofore this company has been engaged solely in the manufacture of building brick, but the enlargement of the plant has been made so as to permit the manufacture of first quality vitrified paving brick. The fact that the company's building material has always been of the A1 quality is sufficient evidence that its paving brick will be of the right sort.

Fireman's Pension Fund in Syracuse

The statement of receipts and disbursements of the Fireman's pension fund in the city of Syracuse shows the receipts, including one per cent. of fireman's salaries from May 1 to December 1, 1903, and the balance on hand, to be $33,772.65. The disbursements in firemen's, widows', children's and parents' pensions were $6,384.42. This sum included the ten per cent. Foreign Insurance Tax to Fireman's Association of the State of New York of $636.96. The balance on hand, December 31, 1903, was $27,388.23. The control, management and distribution of said fund is vested in the Board of Trustees, consisting of the Mayor, Comptroller and Commissioner of Public Safety of the city of Syracuse.

THE "BEST" LIGHT FOR STREETS

THERE is a "know how" in the efficient lighting of streets that the manufacturers have been quicker to realize than city and town officials. The novelty of the electric arc lamp for the lighting of residence streets has long since worn off, but the towns and cities have either an expensive contract or equipment on their hands so that they cannot rid themselves immediately of the inefficient system. An electric arc lamp is all right for a business street and for the residence street that has no shade, but it is a total and expensive failure as an illuminant for the shaded street. The better practice of using the lamp of small candle power—say 100—and placing the lights on alternate sides of the street, from 125 to 200 feet apart is being followed, and many towns and cities have recognized in the "Best" light, made by The Best Street Light Company, 300 to 320 East Fifth street, Canton, Ohio, the *best* light for illuminating their streets, when all points are taken into consideration. The illustrations on this page show three of the many styles of lamps made by this Company for street lighting. If none of these are adapted to your needs, a postal card request will bring you a large illustrated catalogue and other printed matter which cannot fail to be of service in settling the vexed question of street lighting.

NO. 48

What is known as the "Best" incandescent street lamp is shown in No. 48. It is a lamp of 100 candle power, simple in construction, easily operated and using such a small amount of gasoline that it is said to be much cheaper than any other method of street lighting. This is one only of several sizes and styles of the incandescent street lamp made by this concern. This particular style is so simple in construction that any one can operate it, while it consumes so little gasoline, although it is of 100 candle power, that it is vastly cheaper than any other method of street lighting, as claimed by the makers. Incandescent mantles and chimneys of any make can be used on these burners. A similar style is made which can be used without a mantle.

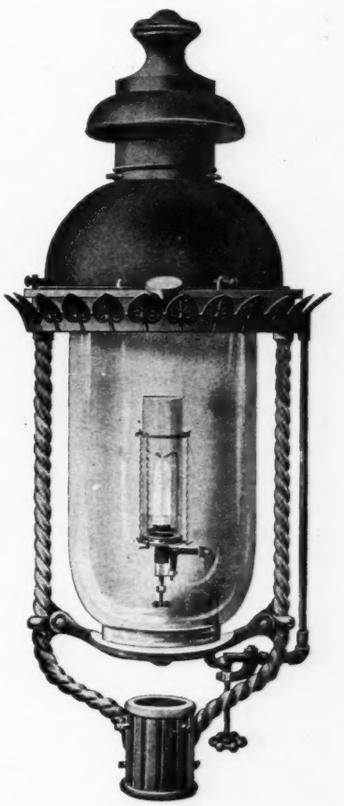
NO. 58

For all kinds of out-door lighting, whether for streets, parks, private grounds or in front of public buildings, No. 58 is considered the thing to use. It is 60 inches high, 24 inches wide and weighs only 19 pounds. This lamp is constructed in the most thorough manner and is beautifully enameled. It is easy to light, absolutely storm-proof and will burn in the coldest weather. By actual tests it has been demonstrated that it will not burn more than 3 pints of gasoline in 15 hours, which, for a lamp of this candle power, is considered remarkably economical. It should be borne in mind that there is no under-shadow to this lamp.

The "Best" boulevard lamp is shown by No. 97. This lamp of 100 candle power, beautiful in design, workmanship, durable—made with iron frame, aluminum finish, copper canopy, opal dome, invisible reservoir, water trap, all fittings in brass and bronze generator. It is 45 inches high, 18 inches wide and weighs 47 pounds. Its globe is removable and all parts are interchangeable. It is storm and insect-proof and will burn in the coldest weather.

It is a well known fact that this company has been in the business over 30 years, during which period it has gained experience in manufacturing all kinds of burners and fixtures for producing light and heat from oils. It would naturally follow that the "Best" lamp is practical, scientific, simple, durable, and artistic. "To put it in a nut-shell," the company says, "the 'Best' lamp is the best lamp, and as every lamp is guaranteed for one year, the purchaser will readily appreciate that a reliable concern would not guarantee an article unless it had been positively proven beyond a doubt that it is as near perfection as it is possible to make it."

The following is the official guarantee offered by the company: "We hereby guarantee the 'Best' vapor gas lamps, manufactured by us under our numerous patents, for a period of one year as to construction and practical mechanical working, and stipulate that they produce a light from 80 to 100 candle power, provided they are handled according to instructions. Should any lamp fail to fulfil this guaranty, we will replace any parts which, upon investigation, prove defective, with new ones without charge. This does not apply to mantles, shades, chimneys, or glassware."



NO. 97

This company claims to make the largest variety of incandescent vapor gas lamps in the world, and it also claims to have the largest, oldest and only complete incandescent vapor gas lamp works in the United States. It is the only company that makes its own fixtures from the brass castings up to the finishing, polishing and lacquering. These lamps are manufactured in all styles, from the plainest to the most elaborate. As some of the fixtures are finished very artistically, they can be used in the finest drawing rooms in the land and will be an ornament. The concern makes all styles of lamps for indoor and outdoor purposes, ranging from 100 to 2,000 candle power. The line includes overhead generators, underneath generators, gravity pressure and air pressure lamps of every description.

A small booklet issued by the "Best" Company tells forty reasons, any one of which is itself sufficient, why the "Best" lamp is the best to use, the best to buy, and the best light-giver in existence. Other booklets issued by the company show illustrations of the "Best" lamp in many different styles. There are also illustrations showing the lamp devoted to the fulfilment of the various purposes for which it was designed.

As to safety, testimonials and more complete information, address The Best Street Light Co., 300 to 320 E. Fifth street, Canton, Ohio.

The William E. Dee Mfg. Company

THE little town of Mecca, twenty miles north of Terre Haute, Ind., in the heart of one of the richest clay districts in the Hoosier State, is the home of The William Dee Manufacturing Company, one of the largest clay working concerns in the country.

This Company owns and operates what are claimed to be the two largest plants of their kind in the North. One plant is devoted exclusively to the manufacture of sewer pipe, while the other is given over to the manufacture of a variety of clay products. With these two extensive plants the Company is able to supply an almost unlimited demand for a complete line of sewer pipe, vitrified drain tile, fire clay, flue lining, fireproofing, wall coping, conduits and other clay products.

These plants are located in the center of an eighty-acre plot of rich clay shale, fire and potter's clay, which is delivered in sufficient quantities, by the latest and most approved appliances, together with an abundance of the best quality of black and bituminous coal.

Plant No. 1 contains two presses and two kilns, sufficient to supply a steady and growing demand for all sizes of sewer pipe. Plant No. 2 has one press and twelve kilns. A partial view of these plants is afforded by the accompanying illustration. Mr. William E. Dee is president of the Company. The main offices are located in Chicago.

Publications Received

—The Aldine Book Company, of New York, has recently issued a brochure of sixteen pages on "The Ozone Treatment of Public Water Supplies," by James Howard Bridge. It is mailed with the compliments of the United Water Improvement Company, Pennsylvania Building, Philadelphia, Pa. It is also stated that the special report upon this important subject recently made by Mr. J. J. de Kinder, the well-known sanitary engineer, will be sent to any address upon request.

THE WILLIAM E. DEE MANUFACTURING COMPANY

—Mr. P. J. Healy, 10 Tremont street, Boston, Mass., has an illustrated catalogue descriptive of the Healy sewer cleaning machines, which he will be pleased to mail to any address upon request.

—"Concrete Construction; a Preliminary Pamphlet," published by Brue & Johnston, 42 Broadway, New York, is mailed with the compliments of The Engineering Company of America, 74 Broadway, New York. A postal card request will bring it to you.

—Such as are interested in the subject will be pleased to receive the attractive fifty-page booklet issued by The Abner Doble Doble Company, of San Francisco, Cal., descriptive of the "tangential water wheels."

—The Harold L. Bond Company, 140 Pearl street, Boston, Mass., will be glad to mail its 254-page illustrated price-list and catalogue of contractors' machinery, tools and supplies to any address upon request.

"Buffalo Pitts" Road Rollers in New England

IT would be hard to find a better system of State road improvement than has been originated and put into practice for several years by State Highway Commissioner McDonald, of Hartford, Conn. After many years of patient and energetic effort he, last year, succeeded in persuading the last township to fall into line, so that at the present time every township in the Nutmeg State is hustling to do its best toward securing the largest amount of well improved roads at the least possible expense. If Commissioner McDonald were permitted to speak he would tell how effectively the Buffalo Pitts road roller, made by the Buffalo Steam Roller Company, of Buffalo, N. Y., had co-operated with him in bringing about his unique system of improved roads.

If Commissioner McClintock, of the Massachusetts State Highway Commission, Boston, Mass., were asked to speak his mind on the use of the Buffalo Pitts steam roller he would tell you that it had been absolutely indispensable in the construction of certain roads in the Bay State. As a matter of fact, it is claimed, there have been more Buffalo Pitts steam road rollers, by eight times, sold within the boundaries of New England during the past year than of all other makes combined. New Englanders are careful and shrewd buyers, and they know what they are buying before they give up their hard-earned cash, which should be sufficient commentary on the quality of the Buffalo Pitts roller. The fact that no better roads are to be found in the United States than can be found in the New England States adds emphasis to the approval of the Buffalo Pitts roller by the various State highway commissioners of that locality.

Items of Interest About the Trade

—After a trial of six months, a complete system of street lighting has been installed in the town of Hubbardston, Mass., by the Automatic Incandescent Light Company, of Northboro, Mass. This action was authorized by a special meeting of the voters of the town to vote upon the question. The use of all other systems has been discontinued.

—The *Four-Track News* for September is breezier than ever, and within its well-edited pages will be found several half-hours of interesting reading matter, not to mention the hearty good laughs to be found among its "Items of Fun." Its subscription price is fifty cents a year, or five cents a copy, and can be had of George H. Daniels, publisher, 7 East Forty-second street, New York.

—"The Quiet Summer Retreats" will soon be closed, but by addressing A. J. Smith, G. P. & T. A., Cleveland, Ohio, you will be "put next" to some reliable information as to where to spend an ideal autumnal vacation.

New York Central's Fleet on Lakes

THE Western Transit Company, which is the New York Central & Hudson River Railroad's freight connection on the Great Lakes, has recently put into commission their new steamer *Duluth*, which is the largest and most modern package freight vessel on the Great Lakes. She is 401 feet long, 50 feet beam and 30 feet depth, with a carrying capacity of 6,000 tons.

This makes seven modern steel steamers in the Western Transit Company's fleet, six of which have been added since 1898, it being the company's policy to add a new steamer each year. In addition to these steel steamers, the company has nine iron and wooden steamers, while, not quite as modern as the steel boats, are still admirably adapted for lake freight transportation. This fleet of sixteen steamers enables the New York Central to give a daily freight service from Buffalo to Milwaukee, Chicago, Duluth and Portage Lake.—*New York Evening Mail, July 27, 1904.*

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Akron, O.—Locust street will be paved with brick. Ray F. Hamlin.

Albany, N. Y.—Ordinance passed to pave Pleasant, Sherman and Yates streets. City Clerk.

Alliance, O.—Will improve East Columbia street, Park avenue; pave Summit street and issue bonds to pave State street and Union avenue. City Clerk.

Ashland, Ky.—$75,000 paving contract rescinded. Will readvertise for bids. City Clerk.

Atchison, Kan.—Will pave Parallel and other streets. City Clerk.

Atlantic City, N. J.—Railroad Company will give $200,000 toward paving Atlantic avenue. City Clerk.

Augusta, Me.—Will purchase a portable stone crusher, not to exceed $1775. Committee on Streets and Sewers of City Council.

Beaumont, Tex.—City Engineer has estimates on the cost of paving Liberty and Alamo streets. City Clerk.

Birmingham, Ala.—Will soon advertise bids for paving with vitrified brick, Eighteenth and Twenty-second streets, Morris and First avenues and Third alley.

Buffalo, N. Y.—Park Board has prepared plans for improving Niagara Square. The estimated cost of paving is $17,618.87; curbing, $1831.

Camden, N. J.—Will pave Auburn street with sheet asphalt; Ninth, Haddon avenues and Spruce street with Belgian block. City Clerk.

Canandaigua, N. Y.—County Board has voted to issue $120,000 bonds for good roads in Ontario County. Also voted to make additions to Bristol Valley road.

Chicago, Ill.—Will appropriate out of the $5,248,095 bond issue, $20,000 for creosoting block plant at House of Correction. City Clerk

Cincinnati, O.—Will pave the following: Scott and Smith streets, Strader avenue, Laredo alley with brick; Burbank street with macadam; resurface Walnut street with asphalt. Will improve Mistletoe avenue. City Clerk.

Cleveland, O.—Ordinance passed on July 18 to pave the following: Fruitland avenue, Tracy, Higgins, Japan, Geauga, Chamberlain, Fullerton, Herrick streets and Kaufman alley with brick; Lorain street with Medina stone; Detroit street with dressed Medina stone on six-inch concrete base. Will pave Orchard street with brick and Pittsburg street with Medina stone. Resolutions published for paving Centennial street with brick and Belden street with dressed block Medina stone on six-inch concrete foundation. Peter Witt, City Clerk.

Columbus, O.—Resolutions have been adopted for repairing High street, estimate, $31,700.50; Broad street, estimate, $10,802.50; Long street, estimate, $2,295; Fourth street, estimate, $1,930. Will pave Innis avenue. City Clerk.

Covington, Ky.—Ordinance passed for the paving of Letitia street with brick and reconstruction of cement sidewalks on Fourth street. John J. Craig, City Clerk.

Cumberland, Md.—Will pave Virginia avenue with vitrified or Ligonier block. City Clerk.

Dayton, O.—Resolutions passed for improving Lorain avenue. Will establish grade on Edgewood and Lexington avenues, open Kiefer street ($3,800), extend West Second street ($3,500) and improve Homestead avenue. City Clerk.

East St. Louis, Ill.—Will improve Ninth street ($36,600), Lynch avenue ($34,063), Cleveland avenue ($41,360). City Clerk.

Grand Rapids, Mich.—Will grade Hall street and pave City Hall alley. City Clerk.

Harrisburg, Pa.—Will pave State street and grade several others. City Clerk.

Hoboken, N. J.—Ordinance passed for paving Sixth street. James H. Londrigan, City Clerk.

Houston, Tex.—Will soon want bids for paving Hogan and Dart streets with brick. City Clerk.

Knoxville, Tenn.—As a result of bond issue, voted on July 16, the following streets will be curbed and macadamized; Jackson, Baxter, Scott, North Sixth, Gillespie, Hinton, Dameron, Depot, Wall, Asylum, Munson, May, University, Ft. Sanders, Cumberland, Yale, Grand, Highland, Glenwood, Armstrong and Melrose avenues; Warden, Robinson, Third, Fourth, Eighth, Ninth, Caledonia, Lee, Spray, Elinor, Granger, Washington, Richards, Marion, Crooked, Boyd, Chalmers, Dorn, Wallace, Pearson, Clinton, Galloway, Ramsey, Carrick, Arthur, Clark, Condon, McKee, Temperance, Craig, Cardwell, McCammon, Campbell, Lovenia, Central, Bluff, Chestnut, Dewey, Folsom, Woodland, Alexander, Stuart and Luttrell streets.

Lowell, Mass.—Estimate for paving Moody street is $28,900.

Memphis, Tenn.—Parkway will be constructed from Riverside to Overton parks. Park Commissioners.

Montreal, Que.—Will widen St. Antoine street. City Clerk.

New Orleans, La.—Funds have been appropriated and plans and specifications drawn for paving with asphalt the following streets: Philip, Prytania, Carondelet, Iberville (three sections), North Franklin, North Liberty, Conti, Milan, Octavia, Lafayette, North, Lapeyrouse and Toulouse, at aggregate cost of $700,000. City Engineer Hardee.

Norfolk, Va.—$18,312 has been appropriated for improving Granby street.

North Ft. Worth, Tex.—Will improve Ellis avenue. J. M. Hill, City Engineer.

Oakland, Cal.—Will pave Sixty-fourth street with class "C" macadam. Sidewalks will be laid on Piedmont avenue. Will vote on September 27, a bond issue to include the following: Park improvements, $1,088,000; boulevards, $130,000; bituminous cross walks, $100,000; stone culverts, $50,000. City Clerk.

Oswego, N. Y.—Will asphalt Third and Fourth streets. City Clerk.

Passaic, N. J.—Will macadamize Delaware avenue the entire length and improve Water street. Thomas R. Watson, City Clerk.

Peoria, Ill.—Board of Local Improvements will pave Fourth avenue and Jackson street with brick. Sidewalks are to be laid on Atlantic, Behrends, California, Delaware and many other streets in Second Ward. City Clerk.

Point Pleasant, W. Va.—$15,000 paving bonds have been voted. City Clerk.

Racine, Wis.—Contemplating paving Sixth, Fourteenth, State, Marquette, Eighth streets and Douglas avenue and much grading.

Rochester, N. Y.—Will pave Aldine and Bernard streets and will probably resurface South ($14,500), Williams ($13,500), Meigs ($4,800), Goodman ($5,400) streets and pave Broizel street ($5,000) and Phelps avenue ($9,200). Contemplating sidewalks on a number of streets also. City Clerk.

Rutherford, N. J.—Bids wanted in September, for grading Summit Cross (street). Wood street and opening Highland Cross (street). City Clerk.

St. Joseph, Mo.—Will grade Fourth, Eighteenth, Cedar and Kemper streets and repave Felix street. City Clerk.

St. Paul, Minn.—Will pave Third street with sandstone and asphalt and will pave Fort street with asphalt. City Clerk.

Salt Lake City, Utah.—All bids for paving Brigham street have been rejected. Will readvertise. City Clerk.

San Francisco, Cal.—Board of Supervisors recently ordered that Church and Army and other streets be paved with bituminous rock on concrete.

Seattle, Wash.—Concrete walks will be laid on Boren avenue, estimated at $20,600; John street, $4,600; Eleventh avenue, $1,590; and Pine street and Second avenue will be paved with asphalt, estimated at $21,000.

Syracuse, N. Y.—Bids wanted for paving West Fayette street. Plans have been prepared for paving University Place with sheet asphalt and South Salina street with vitrified brick. Estimated cost for paving Putnam avenue with sheet asphalt is $20,000. City Clerk.

Tacoma, Wash.—Will construct cement sidewalks on Division avenue, North First, North Second, North Third, North Fourth, North Fifth, North Sixth, South Twelfth, South Thirteenth, South Fourteenth, South Fifth, South Prospect, State, Frafton, Fife, Oakes, Pine, Anderson, North Eighth and others. City Clerk.

Toledo, O.—Will pave Fulton, Oneida and Chicago streets. City Clerk.

Toronto, Ont.—Board of Control has passed City Engineer Rust's recommendation of $101,370 for block and other paving. Bids are wanted for $8,300 asphalt, $15,161 macadam roads, $18,824 concrete sidewalks and $2,492 granolithic walks. City Clerk.

Trenton, N. J.—Will pave Barbara and Behm streets. City Clerk.

Webb City, Mo.—Will pave Allen, Main and Dougherty streets. City Clerk.

West Hoboken, N. J.—Will pave West street with brick; Hague and Elm streets with Belgian block; and Palisade avenue with trap rock paving block. Town Clerk.

West New York, N. J.—Will pave Bergenline avenue. Bids wanted for paving Palisade avenue, Madison and Seventeenth streets. City Clerk.

Winnipeg, Man.—Will asphalt Sargent and Logan avenues, $9,448 and $35,275 respectively. Bids wanted soon for $70,715 asphalt paving; $2,652, cedar block, and $11,590, granolithic sidewalks. City Clerk.

Youngstown, O.—Will pave Elm street and Wilson avenue. Will probably improve Grandview avenue, Hawn and Livingston streets. City Clerk. County will macadamize Youngstown-Austintown road. County Auditor.

Contracts Awarded

Akron, O.—Contracts for paving let as follows: Berg street, $4,430.20, and Bartges street, $9,610.16 to France and O'Marr, both paved with Canton block; College street, with Akron granite block, $19,731.52, to James Wildes; Buchtel avenue, Malverjn block, $16,-227.22, to F. B. Dodge; West Exchange street, Akron Standard brick, $44,852.75, to P. T. McCourt; Perkins Boulevard, macadam, $13,295, to Hunt and Wigley; South street, slag pavement, $9,187.30, and Bell street, slag pavement, $8,392.86, to Daniel W. McGarry.

Covington, Ky.—Contract for paving Scott street with brick, to P. J. Collopy, Newport, at $24,000.

Detroit, Mich.—Paving contracts awarded as follows: Cadillac avenue, cedar on concrete, Buckeye gray curbstone, to Michigan Contracting Co., at $22,794.86; McDougall avenue, cedar on concrete, Amherst curbstone, to James Hanley, at $25,555.85; Locust street, brick on concrete, to James Hanley, at $1,764.77; asphalt repaving, to Barber Asphalt Paving Co., as follows: Wilcox street, $1,527.85; Davenport street, $6,159.11; Fourth avenue, $14,144.36; Harper avenue, $9,031.14; Seldon street, $10,315.60; Elizabeth street, $7,247.25; Henry street, $6,309.80.

Economy, Pa.—Contract for paving Merchant street, to Thomas Sweeney & Co., $51,000.

Jacksonville, Fla.—Contract for paving Main, Ocean and Newman streets, with Coaldale vitrified paving brick, to Jacksonville Tile Paving Co., at $1.69 per square yard. Work aggregates 1,700 square yards.

Newark, N. J.—Contract for paving Seymour avenue with brick, to Newark Paving Co., at $12,550. Contract for paving Biglow street to J. Roosevelt Shanley, at $4,608.

Pittsburg, Pa.—County awarded contracts for roads as follows: Foster road, $34,169, and Coultersville road, $15,385, to W. W. Kelley; Monroeville road, $54,860, to Foley Brothers; Campmeeting road, $46,375, to Keeling & Ridge.

Rochester, N. Y.—Contract for paving New Portland avenue, to Rauber & Vicinus, at $67,523. Contract for brick pavement on Joseph avenue, to H. N. Cowles, at $25,850.

Rome, N. Y.—Contract for paving with Syracuse brick, East Domnick street, to W. J. Cramond, at $26,009.

Seattle, Wash.—Contracts awarded for paving: Terry avenue and Alder street, to Barber Asphalt Paving Co., at $12,525.44; North Tenth avenue, grading, to S. Normile, at $10,785; Occidental avenue, grading, paving, sewering, concrete walks, and water mains, to Stirrat & Goetz, at $63,143.80; Mercer street, concrete walks, Frank & Brandon, at $15,144.64; Twenty-first avenue, concrete walks, to T. Ryan, at $4,430.84; East Pine street, concrete walks, $9,839.50, and Alder street, concrete walks, $4,616.70, to Fritch & Co.; Third avenue, asphalting, to Barber Asphalt Paving Co., at $6,425.30; Broad street, grading, to P. J. McHugh, at $44,255.

Spokane, Wash.—Contracts awarded: Division street, asphalt paving, to Barber Asphalt Co., at $24,857.30; Augusta avenue, sidewalk, to Barber Asphalt Co., at $2,636.70, and for grading same, to Peter Costello, at $5,600; Pacific avenue, grading and sidewalking, to August Ilse, at $2,000.

Toledo, O.—Contract for repaving Legrande street, to Bodette & Sheenan, at $63,811.20, and Canton street, to Garrigan Brothers, at $30,488.40.

LIGHTING

Afton, Ia.—Voted on August 8 to erect an electric light plant.

Baltimore, Md.—Subway engineer is preparing plans for a municipal lighting and power plant near Central Market.

Bay City, Mich.—$49,500 bonds have been sold for improvements for the electric light plant.

Boone, Ia.—It is proposed to construct a $20,000 electric light plant. T. L. Jones, City Clerk.

Camden, N. J.—Will install a $2,180 electric light plant at Morris Water Works station to light same. Water Committee of City Council.

Chicago, Ill.—Will appropriate, out of the $5,248,095 bond issue, $200,000, for the extension of the lighting system. City Clerk.

Clinton, Miss.—Will establish an electric light plant. City Clerk.

Clinton, N. Y.—Will vote soon on issue of bonds for municipal electric light plant.

Columbia, Mo.—City has bought local electric light plant and will improve same. City Clerk.

Columbus, O.—Ordinance has been passed to issue $70,000 bonds for an electric light system. City Clerk.

Covington, Ky.—$75,000 bonds will be issued for the erection of an electric light plant. City Clerk.

Edgar, Wis.—$5,500 bonds were voted on August 9, for the erection of a municipal gasoline gas plant.

Griffin, Ga.—Engineer has been engaged to prepare plans and specifications for an electric light plant.

Groton, Conn.—$20,000 bonds have been voted to buy local electric light plant.

Hazelgreen, Wis.—It has been voted to issue electric light plant bonds.

Jeanerette, La.—Will erect an electric light plant.

Kalamazoo, Mich.—An issue of $20,000 bonds has recently been voted for improvements to the electric light plant.

Kingston, Ont.—City having bought the local electric light plant, will improve it to the extent of $100,000. City Clerk.

Lansing, Mich.—$20,000 will be spent on the improvement of the municipal light system. City Clerk.

Little Falls, Minn.—City Council is contemplating the issuance of $10,000 electric light plant bonds.

Luverne, Ala.—May call for bids on September 10, for the erection of an $8,000 electric light plant. City Clerk.

PUBLIC BUILDINGS

McKeesport, Pa.—Common Council has passed an ordinance for the issuance of $125,000 bonds for a municipal electric light plant.

Macon, Miss.—An electric light plant will be erected by the City. City Clerk.

Ocala, Fla.—$45,000 bonds have recently been voted, a part of which will be used to improve electric light plant. City Clerk.

Oxford, Miss.—Will issue $8,000 electric light plant bonds. City Clerk.

Penn Yan, N. Y.—Contract rescinded for lighting plant and will vote again on $35,000 bond issue.

Preston, Ont.—$27,000 have been voted for municipal electric light plant. City Clerk.

Richmond, Ind.—Considering the erection of a municipal electric light plant.

Richmond, Va.—Ordinance to be introduced in Common Council to issue $300,000 bonds for electric light plant.

St. Ignace, Mich.—On August 8, it was voted to issue $15,000 electric light bonds.

St. Joseph, Mo.—It was voted, on July 30, to issue $75,000 bonds for municipal electric light plant. City Clerk.

Searcy, Ark.—Bids wanted on September 15 for the construction of an electric light plant.

Seattle, Wash.—Plans have been filed for sub-power station for the municipal lighting plant.

Sioux Rapids, Ia.—Contemplating either buying local electric light plant or erecting one. Council Committee.

Spring Valley, Minn.—Plans have been adopted for the erection of a $10,000 municipal electric light plant.

Traverse City, Mich.—Contemplating installation of municipal electric light plant in connection with the water works. City Clerk.

Union Hill, N. J.—Bids wanted for municipal lighting contract.

Ventura, Cal.—Expect to vote soon on bond issue for electric light plant.

Watkins, N. Y.—City has sold $20,000 bonds for the erection of a municipal electric light plant.

Webster, Ia.—A municipal gas plant will be installed. City Clerk.

Woodsville, Miss.—On July 20, $75,000 bonds were voted for a municipal water works and electric light plant.

Contracts Awarded

Jasper, Ind.—Contract awarded to Schmidt & Renner for power-house of municipal lighting and waterworks plant, at $12,982.

Lansing, Mich.—Awarded contracts as follows: 600-horse-power engine, to Buckeye Engine Co.; 425 kilowatt generator, to Bullock Electric Manufacturing Co., Milwaukee, Wis.; condensor, to George F. Blake Manufacturing Co., Detroit; total, $13,500.

Lincoln, Neb.—Awarded municipal electric light contract to George H. Morse, at $65,000.

Newberry, S. C.—Contract for electric light plant to General Electric Co., Schenectady, N. Y., at $5,905.

Syracuse, N. Y.—Board of Supervisors awarded contract for court house power plant to Henry Ryan, at $90,800.

Wilburton, Ind.—Contract for proposed $50,000 municipal electric light plant to James Degnan. City Clerk.

Winfield, Kan.—Contract for $30,000 electric light plant to E. L. Overton, Topeka.

SEWERS

Akron, O.—Will issue $13,000 bonds for placing sewers on Furnace, Turner, Stanton and Wooster streets. Ray F. Hamlin, City Clerk.

Altoona, Pa.—Ordinances have been passed by Select Council for the construction of sewers on Twenty-first, Sixteenth, Eleventh and Willow avenues.

Albany, N. Y.—Ordinances have been passed for sewering Myrtle avenue and Colonial and Lark streets. City Clerk.

Baltimore, Md.—Legislature has authorized a $10,000,000 sewerage loan, which may be voted on by the city, this fall. City Clerk.

Barberton, O.—$8,000 bonds have recently been sold for sewer extensions on Fifth and Sixth streets and Creedmore avenue. City Clerk.

Binghamton, N. Y.—Pearl and Chenango streets will be sewered. City Clerk.

Bridgeport, Conn.—Bids wanted for trunk sewer extension on Huntington road, known as Noble avenue sewer. Director of Public Works.

Buffalo, N. Y.—$74,000 sewer for Abbott road, Tifft, Hopkins and other streets has been approved by the Board of Aldermen. One of the improvements to Niagara Square will be a sewer estimated at $2,700, and Edgewood and Domedion avenues will each have sewer extensions estimated at $2,000 each. City Clerk.

Camden, N. J.—Elm and High streets will have sewer extensions. City Clerk.

Canastota, N. Y.—Board of Trustees are contemplating the installation of a $50,000 trunk sewer. Address Dr. William Taylor, Health Officer.

Dansville, N. Y.—On August first $95,000 sewer system bonds were voted. City Clerk.

Duluth, Minn.—Council has ordered City Engineer to establish a sewer system for Duluth Heights.

Dyersville, Ia.—G. H. Merridith, Cedar Rapids, has been engaged to prepare plans and specifications for a complete system of sewers.

Easthampton, Mass.—Surveys are being made for extensive sewer work.

Griffin, Ga.—Engineer is preparing plans and specifications for contemplated sewer system. Bonds have been voted. City Clerk.

McKeesport, Pa.—Common Council passed ordinance for the issuance of $70,000 bonds for new sewer system.

Montgomery, Ala.—It is estimated that the storm water sewer on Whitman street will cost $3,500.

Mt. Vernon, Ill.—The Iowa Engineering Company, Clinton, Ia., is preparing plans and specifications for a sewer system for this city.

Newark, N. J.—Assessment notice published for the proposed extension of sewers on Hunterdon and Bergen streets; Littleton, Chadwick and Watson avenues; Osborne, Terrace and Hawthorne Place. Will readvertise for bids for Fourteenth street relief sewer. City Clerk.

Niagara Falls, Ont.—Recently voted $16,000 bonds for trunk sewer extension in South End of city.

Oakland, Cal.—Fifty-first street will be sewered with eight-inch salt-glazed, vitrified, iron-stone pipe. Will vote September 27 on sewer bond issue for main sewer extension, $70,000; east side sewer extensions, $20,000; Twenty-first avenue sewer extension, $20,000. City Clerk.

Perry, Ia.—Bids are wanted for plans and specifications for sewer system. Adrian Cross, City Clerk.

Rensselaer, N. Y.—Will sewer Second street with 8-inch and Fourth street with 12-inch pipe. City Clerk.

Saginaw, Mich.—Will sewer Russell, Twelfth, Eleventh, Granger, Webster, Madison streets, Fourth avenue and extend Holmes street sewer to the amount of $3,000. W. H. Barton, City Clerk.

St. Joseph, Mo.—Voted July 30 to issue $250,000 sewer bonds. Will place sewers in Sewer Districts Fourteen, Forty and Seventy-two. City Clerk.

St. Paul, Minn.—$15,000 appropriated for sewer extensions on Thomas, Oxford and Charles streets. Estimated cost of sewer for Grand View Heights, recently sent by City Engineer Rundlett to Board of Public Works is $48,566. City Clerk.

Schenectady, N. Y.—Will sewer Jay, South Ferry, Fuller and Second streets; Delaware avenue, Seward Place and Landon Terrace. City Clerk.

South Bend, Ind.—Will sewer Van Buren, Allen, Birdsell, Bronson, Market, Osborn streets; Cottage Grove, Blaine and Cleveland avenues. President Board Public Works.

Tacoma, Wash.—Will lay an 8-inch sewer on North Seventeenth street. L. H. Pearson, Clerk to Commissioner of Public Works.

Toronto, Ont.—Bids wanted for $151,500 for sewer extension. City Clerk.

Youngstown, O.—Will sewer Cleveland, Flint Hill and Wade streets and Franklin avenue.

Winnipeg, Man.—Bids to be asked soon for $44,310 sewers. City Clerk.

Wyandotte, Mich.—Plans prepared for sanitary sewer, estimated to cost $51,000, and storm sewer, $66,000. City Clerk.

CONTRACTS AWARDED

Boise City, Idaho.—City Clerk Charles H. Irvin writes that contract for main sewer was let to James Kennedy, Fargo, N. D., at $114,965.50.

Galveston, Tex.—Contract for sewer in Thirty-third street, to Nichols & Haney, at about $16,000.

Holyoke, Mass.—Contract for 85 tons 10-inch cast-iron pipe, to Donaldson Iron Company, Emans, Pa., at $23.48 per straight net ton; special, $2.62½ per 100 pounds.

Nashville, Tenn.—Contract for 1,550 feet of circular brick sewer, 54, 45 and 42 inches in diameter, to Nashville Plumbing Co, 600 Broad street, at $3,964.90.

New Orleans, La.—Executive Committee recommends that contracts for sewers be let as follows: For Orleans and Aniborne covered canals to Dowdle & Windett, at $92,650; Hagan avenue lined and covered canals to same, at $92,370.

St. Paul, Minn.—Sewer contracts awarded: King street, Chris. Johnson, $2,035; Banfil street, J. M. Thornton, $1,973; Lafond street, John Lind, $1,141; Delos street, Chris. Johnson, $317.65.

Seattle, Wash.—Contract awarded for grading, sewering, water mains, paving and concrete walks on Occidental avenue, to Stirrat & Goetz, City, at $63,143.80.

Spokane, Wash.—Contracts to Peter Costello for sewers in First Ward, District 2, at $59,800, and on Second avenue at $5,850.

WATER SUPPLY

Abbeville, La.—Will vote soon on $45,000 water works bond issue.

Abbotsford, Wis.—$13,000 bonds for a water works system have beeen voted.

Aberdeen, Mass.—Bids wanted in from forty-five to sixty days for water works system. City Clerk.

Bradley, Ill.—Having plans for water works system drawn. City Clerk.

Brockton, Mass.—$25,000 have been appropriated for the extension of water mains. City Clerk.

Buffalo, N. Y.—Will ask for bids soon for the construction of a fire pipe line on Pearl street. Commissioner of Public Works.

Cambridge, Mass.—Ordinance passed July 26, to issue $250,000 bonds for water conduit from Watertown to Fresh Pond. City Clerk.

Carlisle, Ky.—Will erect $25,000 water works system. Bonds have been sold.

Carrollton, Miss.—Water works bonds have been voted. Estimated cost of works is $11,000. City Clerk.

Chariton, Ia.—Water works will be constructed in connection with electric light plant. Estimated cost is $40,000.

Chattanooga, Tenn.—Plans are being prepared for a $656,000 water system. City Clerk.

Cincinnati, O.—Bids are wanted on September 9 for the construction of settling reservoirs near the village of California. Includes grading, asphalt and brick revetment and inlets, etc., 12,500 feet of macadam road, 800 feet of sewer drains, 1 mile of 5 and 6-foot pipes and 10,800 lineal feet smaller pipes. Superintendent Charles G. Roth.

Cleveland, O.—Ordinance passed to issue $150,000 bonds for water works extension and improvements. Has appropriated $12,000 for brick for meter vaults, $5,000 for iron rings and covers, $7,000 for sewer pipe to enclose small meters, and $1,100 for hinges.

Columbia, Mo.—City has bought local water works and will improve same. City Clerk.

Columbus, Ga.—Plans will be prepared for a 20,000,000 to 30,000,000 gallon reservoir and a distributing system. Bids will be called for. City Clerk.

Columbus, O.—Committee on Water Works of city council recently passed a resolution to put the $1,200,000 filtration plant bond issue to popular vote.

(Continued on page 29.)

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Corinth, Miss.—Bids wanted on September 6 for water works. City Clerk.

Creemore, Ont.—$17,000 have recently been voted for a water works system. Town Clerk.

Danville, Va.—Engineer has been engaged to draw plans for a filtering and pumping station. Bids wanted soon.

Donaldsonville, La.—Has engaged engineer to prepare plans and specifications for a $30,000 water works system. City Clerk.

East Toronto, Ont.—Bids wanted soon for a new $55,000 water works. City Clerk.

Enid, O. T.—All bids for proposed $85,000 water works have been rejected, and will re-advertise for new bids. City Clerk.

Ford City, Pa.—Plans are being drawn for a $35,000 water works.

Frederick, Ill.—It is reported that $10,000 water works bonds have been sold.

Heber, Utah.—$12,000 water works bonds have been voted. City Clerk.

Hoboken, N. J.—Will lay cast iron water main on Newark avenue, etc.—$128,000.

Kansas City, Mo.—$600,000 water works bonds were sold on July 11. Engineer for water works recommends the purchase of more water works pumps and pipes.

La Crosse, Wis.—$85,000 filtration plant may be installed.

Lumberton, Miss.—$20,000 water works bonds have been issued. City Clerk.

Macon, Miss.—All bids for $30,000 water works have been rejected and will re-advertise.

Menominee, Mich.—Considering the installation of a $56,000 filtration system.

Montgomery, Ala.—Having plans prepared for extension and improvement to water works, which will include standpipe, reservoir, water mains. Estimate, $100,000.

Montreal, Que.—Will buy three Babcock & Wilcox boilers for $15,000 for the water works.

Mountain View, Cal.—Recently voted to issue $28,000 water works bonds.

New Orleans, La.—Bids will be advertised for soon for four 20,000 gallon vertical triple-expansion engines, boilers erect, for main water works. Bids wanted for laying water mains and water works machinery. Will want bids in 1905 for 8,000 or 10,000 tons of water pipe.

Pittsburg, Tex.—Will vote September 12 on $7,500 water works construction bonds.

Port Deposit, Md.—City will improve water works system by adding reservoir, artesian well and pump. City Engineer Mutch.

Seattle, Wash.—Water mains will be laid on Fifth avenue, north ($5,500) and Third avenue ($1,300). Fire hydrant system, estimated at $1,200, will be installed on Fifteenth avenue, also water main will be laid on Colorado street, estimated at $9,200.

Spartansburg, S. C.—Treasurer of the Home Water Supply Company writes that estimates are wanted by John B. Cleveland, president, on two or three miles of 12 and 16-inch double strong terra cotta water pipe and on a 1,000,000 to 1,500,000 gallon filter and on pumps of same capacity.

South Norwalk, Conn.—Recently voted to erect a $60,000 filtration plant.

Springfield, Mass.—Council has passed a $300,000 filtration bond issue ordinance on third reading.

Tifton, Ga.—Surveys and plans have been completed for a $32,000 water works system. City Clerk.

Vallejo, Cal.—Engineer has estimated that the cost of renewing the 14-inch cast-iron pipe line to Green Valley will be $106,492.

Washington, Ga.—Will vote September 15 on $30,000 bond issue for enlarging and extending water works.

Wilmington, Del.—Having plans and specifications made for proposed $1,000,000 water works system.

Woonsocket, R. I.—Considering the installation of a $45,000 pumping station and filtration plant.

(Continued on page 30.)

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CONTRACTS AWARDED

Aliquippa, Pa.—Contract awarded to Chandley Brothers, Beaver Falls, for water works, at $14,000.

Allentown, Pa.—Contract for a 10,000,000 gallon engine for a D'Auria pump, to Allentown Rolling Mill Company, at $28,000.

Antioch, Cal.—Contract for pumping house and machinery to Stanley Contracting Company at $5,749, and for steel tower and tank to Clark and Henry, at $6,290.

Blasdell, N. Y.—Contract for water works let to Thomas Fitzgerald, Jr., Fredonia, as follows: 11,300 feet 8-inch cast iron pipe at $.28 per foot; 5,000 feet 10-inch tile pipe at $.30 per foot; 5,600 feet 12-inch tile pipe at $.35 per foot; 300 feet 12-inch cast iron pipe at $1.50 per foot; 1,000 cubic yards of rock excavating at $1.50 per cubic yard; three setting hydrants at $10 each; 14 000 cubic yards earth excavation at $.27 per cubic yard; 30 cubic yards of earth excavation, below grade, at $1.50; total, $12,104.

Boyerton, Pa.—Contract for reservoir to James N. Smith, Perkiomenville, at $3,392.

Burlington, Ia.—Contract awarded to Murray Iron Works for four steel tanks at about $10,000.

Cincinnati, O.—Contracts let for laying water pipe as follows: Woodburn avenue, to T. H. Kirchner, Eighth and Plum streets, at $9,129; Madison road, to F. Burns, 633 June street, at $3,972; Hershal and Observatory avenues, to Glazier & McLain, Newport, Ky., at $1,833.

Dallas, Tex.—Contract for cast iron water pipe and fittings to D. F. Sullivan, at $1,200.

Fulton, N. Y.—Closed contract with Snow Pump Company, Buffalo, for a 3,000,000 gallon pump, at $5,077. Water main for better pressure to high ground on Fourth street will be laid.

East Orange, N. J.—Contract to Commonwealth Roofing Company for coal pocket for water works, at $4,739.

Eldridge, Ia.—Contract for water system to Des Moines Bridge and Iron Company, Des Moines, at $7,660.

Evansville, Ind.—Contract for repairing broken intake to the Western Submarine Engineering Construction Comany, Chicago, Ill., at $27,950.

Gloucester City, N. J.—Contract for mains in Mercer and Fillmore streets to J. Smith, at $4,500.

Houghton, Mich.—Contract for reservoir and pipe lines reported let to Johnson & Latteral, at $33,971.

Joliet, Ill.—Contract for laying water main in Third avenue to George P. Smith, at $1,475.

Kasson, Minn.—Awarded water main extension contract to W. I. Gray & Co., Minneapolis, at $3,357.

Lima, O.—Contract for water works extension to J. C. Lineman, Joseph B. Mayer and others, at $144.850.

Marietta, O.—Contract for water works to Philip Sheets, New Comerstown, O., at nearly $21,000.

Milwaukee, Wis.—Contract awarded for 20,000,000 gallon pumping engine to William Tod Company, Youngstown, O., at $74,000.

Seattle, Wash.—Contract awarded for sewer, pavement, water mains, concrete walks and grading on Occidental avenue, to Stirrat & Goetz, at $63,143.80. Contract for water main on Twenty-fifth avenue, South, and Norman streets, to F. McHugh, at $5 922.

Wheeling, W. Va.—Contract for 30-inch water main, from Slacktown pumping station to Robert W. Kyle Company and Contractor Halleck, at $75,000.

PUBLIC BUILDINGS

Alhambra, Cal.—Wants bids soon for $45,000 high school building.

Altoona, Pa.—Bids wanted for the erection of a $200.000 high school building.

Baltimore, Md.—Competitive plans will be asked for soon for proposed new Eastern high school building. Estimated cost, $250,000.

Bicknell, Ind.—Plans for the new $24,000 school building have been accepted. Board of Education.

Boston, Mass.—Plans approved for the $85,000 school building to be erected on Southern avenue.

Carthage, N. Y.—Plans have been approved for a $10,000 annex to the high school building.

Chicago, Ill.—Will appropriate $85,000 for a bath house out of the $5,248,095 bond issue. City Clerk.

Chiloco, O. T.—Will erect a $30,000 school building. S. M. McCowan, Supt.

Cleveland, O.—Ordinance passed to issue $15,000 bonds for buildings of refuge and correction and $10,000 for public comfort station. Peter Witt, City Clerk.

Denver, Col.—Permission has been granted Board of Education for the erection of two school buildings estimated at $25,000 and $42,000, respectively.

Duluth, Minn.—Will erect a $40,000 court house.

Elgin, Ill.—Plans are being prepared for a $120,000 high school building.

Florence, S. C.—Will erect a $35,000 school building.

Gadsden, Ala.—$25,000 city hall bonds have been voted. City Clerk.

Galena, Ill.—Plans have been adopted for a $65,000 high school building. City Clerk.

Gibsonville, N. C.—Adopted plans for $40,000 school building.

Greenville, Miss.—Plans for a $25,000 school building have been accepted. City Clerk.

Homestead, Pa.—$55,000 bonds were sold on August 1, part of which are to be spent for town hall. City Clerk.

Lansing, Mich.—Plans ave been accepted for proposed Townsend street school building. Estimated cost $15,000. Board of Education.

Louisville, Ky.—Plans have been prepared for a $225,000 public library. City Clerk.

Lowell, Mass.—$70,000 bonds have been voted for new school building on Ennell street by the Education Committee.

McKeesport, Pa.—Common Council passed ordinance for issuance of $100,000 bonds for a new city hall.

Mangum, O. T.—$20,000 bonds have been voted for high school building. City Clerk.

Minden, La.—Bids September 8 for new court house. W. G. Stewart, President Board of Police Jurors.

Morehead, N. C.—Plans have been adopted for $40,000 school building.

Mt. Vernon, Ill.—Plans are ready for a $25,000 township school building.

Natchez, Miss.—Plans have been adopted for new $10,000 jail building. Contracts to be let in October. Police Jury of Tensas Parish.

New Decatur, Ala.—Bids wanted soon for proposed new $7,000 city hall. City Clerk.

Oakland, Cal.—Supervisors have sold $960,000 bonds for school buildings. Will vote September 27 on bond issue for the purpose of building a $375,000 city hall; furnishing same, $25,000; improvements to free library, $15,000; polytechnic high school, $150,000. City Clerk.

Opelousas, La.—It has been recently decided to erect a $35,000 jail building.

Philadelphia, Pa.—$2,130,000 have been appropriated by the Board of Education for permanent school improvements.

Pittsburg, Pa.—Civic Club has recently purchased sight for public bath. Estimated cost of bath house $35,000.

Platteville, Wis.—Will erect $15,000 school building.

Reistertown, Md.—Plans have been ordered for $23,000 school building.

St. Paul, Minn.—Contemplating the erection of two high school buildings to cost $318,500. Board of Education.

San Francisco, Cal.—Will sell October 3 the following bonds: $1,077,000 for schools; $739,800 for libraries; $278,000 for county jail and hall of justice, and $250,000 for hospitals.

Sebewaning, Mich.—Plans being prepared for $25,000 school building.

Seneca Falls.—Plans prepared for a $24,500 school building.

Stewartsville, N. J.—Will erect a $15,000 school building.

Trenton, N. J.—$50,000 bonds have recently been sold for a school building on Brunswick avence. City Clerk.

Vincennes, Ind.—$25,000 have recently been authorized for the erection of a school building. Board of Education.

Washington, D. C.—Plans being prepared for a $47,000 school building. District Commissioners.

Wynne, Ark.—Plans have been drawn for a $32,000 court house. Architect, L. M. Weathers, Memphis, Tenn.

CONTRACTS AWARDED

Blakeley, Ga.—Contract for Early County $40,000 court house to Morgan & Dillon, Atlanta.

Boone, N. C.—Contract for $20,000 court house to L. W. Cooper, Charlotte, N. C.

Danbury, N. C.—Contract for $20,000 court house for Stokes County to L. W. Cooper, Charlotte, N. C.

East Hartford, Conn.—Contract for front addition of present school building to F. D. Kent, Hartford, at $11,525.

Edgewater, N. J.—Contract signed with Central National Construction and Realty Company for new borough hall, at $24,500.

Elkhart, Ind.—Contract for post office to W. J. McAlpine, Dixon, Ill., at $58,400.

Fayetteville, Ark.—Contract for erection of court house building awarded to G. W. Donaghey, Conway, Ark., at $90,000.

Franklin, Ind.—Contract for erecting Hopewell school building to George Anderson, at $9,465.

Gaithersburg, Md.—Contract for high school building to Alfred C. Warthen, at $8,400.

Galesburg, Ill.—Contract for high school building awarded to Davidson & Rundquis, at $97,634.

Gloversville, N. Y.—Contract for construction of post office building to Buckley Construction Company, Schenectady, at $51,088.

Hamburg, Ark.—Contract for construction of new court house to Caldwell & Drake, at $32,987.46.

McKeesport, Pa.—County awarded jail contract to A. and S. Wilson, at $568,050.

Missoula, Mont.—Contract for high school building to W. D. Keeney, at $35,829.58.

Moultrie, Ga.—Contract for school building to G. W. Milligan, at $18,100.

New Orleans, La.—Contract for the construction of school building 31 to F. J. Noullet, at $40,997.

Oklahoma City, O. T.—Contract for court house to Gross Construction Company, Magazine, Ark., at $99,999.

Rochester, N. Y.—Contract for five precinct police stations to Fred Gleason, at $115,795.

South Bend, Ind.—Contract for Henry Studebaker School to Henry G. Christman, at $24,878.

West Bay City, Mich.—Contract for school building to H. C. Weber, at $19,495.

FIRE DEPARTMENT SUPPLIES.

Camden, N. J.—Site has been selected, and Thomas Stephens, architect, has submitted plans for a new fire station to cost $8,537. City Clerk.

Chattanooga, Tenn.—Fire Chief H. A. McQuade wants city to buy new steam fire engine, combination chemical and hose truck, light hook and ladder truck and recommends fire hall for west side of city.

Chelsea, Mass.—Funds appropriated for combination hook and ladder truck. City Clerk.

Chicago, Ill.—$50,000 to be appropriated to extend fire and police alarm system. Will appropriate out of the $5,248,095 bond issue $281,700 for new fire stations and $20,000 for police stations. City Clerk.

Chillicothe, O.—Will buy hook and ladder truck. City Clerk.

Cumberland, Md.—$25,000 bond issue has been authorized for paid fire department. City Clerk.

Dallastown, Pa.—$5,000 will be spent for the purchase of a fire engine. City Clerk.

Dubuque, Ia.—Will erect fire station in Fifth Ward. City Clerk.

East St. Louis, Ill.—Will buy fire engine. The Mayor.

Elyria. O.—Contract will be let soon for $4,500 fire station; $1,000 has been appropriated for fire hose, etc. City Clerk.

Janesville, Wis.—Bids wanted soon for the erection of a fire station. City Clerk.

(Continued on page 32.)

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Knoxville, Tenn.—Will buy 5,000 feet of fire hose, cellar pipes, new fire engine and improve in other ways the fire fighting equipment.

La Grange, Ga.—Will vote September 14 on issuing $5,000 fire house bonds.

Lake Geneva, Wis.—Will buy hose wagon, hose, rubber coats, nozzles, etc. J. Barfield, Chairman.

Lansing, Mich.—Plans have been adopted for a $15,000 engine house. City Clerk.

Madison, Wis.—$5,000 bonds have been authorized to purchase a new fire engine with.

Manhasset, L. I., N. Y.—Purchase Committee will secure fire engine, ladder, truck, etc.

Marshalltown, Ia.—Will erect a $5,000 fire and police station. City Clerk.

Mobile, Ala.—City will purchase two fire engines. The Mayor.

Omaha, Neb.—Will advertise for combination chemical and hose wagon and 1,000 feet of hose.

Osmond, Neb.—Will erect a $2,000 brick fire station. City Clerk.

Passaic, N. J.—Will buy new hose wagon for Enterprise Company. City Clerk.

Phoenixville, Pa.—Will erect new fire house and buy hose.

Portsmouth, Va.—Union Fire and Hose Company No. 1 expect to buy fire engine this fall. The Mayor.

St. Louis, Mo.—City Council has appropriated $26,000 for two new fire houses. City Clerk.

Utica, N. Y.—Plans have been approved for new fire engine houses for West and East Utica. City Clerk.

Vallejo, Cal.—Will buy fire apparatus. City Clerk.

Washington, D. C.—Needs six new engine houses, two chemical hose wagons, two 65-foot aerial trucks, two second size, two third size and one fourth size steam fire engines. Commissioner Macfarlane will secure plans for fire boat, for which Congress appropriated $63,000. Commissioners will erect fire engine house in Navy Yard.

CONTRACTS AWARDED

Camden, N. J.—Contract for second-size fire engine to American Fire Engine Company, at $5,250. Contract for combination chemical and hose wagon to La France Fire Engine Company, at $1,975. Contract for fire hose to James Boyd & Co., at $.90 per foot for 3,200 feet.

Quincy, Ill.—Contract for combination chemical and hose wagon to Chicago Apparatus Company, Chicago, at $1,500.

Rochester, N. Y.—Contract for Hudson avenue fire house to William F. Maas, at $24,815.

Trenton, N. J.—Contract for Engine House No. 6 to Samuel W. Mather, at $10,278.

MISCELLANEOUS.

Atchison, Kan.—On August 1 it was decided to purchase two street sweepers. John Crompton.

Bath, N. Y.—Fred Y. Wynkoop, Pulteney Land Office, wants data on road rollers.

Chattanooga, Tenn.—Park will be laid out on the east side of city. City Clerk.

Centralia, Ill.—Sewage disposal plant will be erected. City Clerk.

Chicago, Ill.—Commissioners have secured eighty-five acres of land and a park will be laid out for South Chicago. $130,000 will be appropriated for a garbage disposal plant.

Cincinnati, O.—Will secure land in the vicinity of McMillan and Vine streets and lay out a public park.

Cleveland, O.—Ordinances have been passed for the issuance of $150,000 bonds for river and wharf improvements and $25,000 for improving and enclosing public cemeteries. Peter Witt, City Clerk.

Columbus, O.—Ordinance passed for the appropriation of $130,000 to complete levee work for sewage disposal plant.

Crafton, Pa.—Bids wanted September 6 for garbage destructor.

Jersey City, N. J.—Finance Board passed resolution to appropriate $1,800 for play ground.

Kingston, N. C.—Data wanted on street drinking fountains. City Clerk.

Lexington, Ky.—Wants data on garbage crematory. Thomas A. Combs, Mayor.

Montgomery, Ala.—Expects to vote September 5 on a $40,000 bond issue for placing wires underground. City Clerk.

Newport, Ky.—Council has ordered telephone company to place all its wires underground.

New York City, N. Y.—Board of Finance has appropriated $183,000 for increasing Manhattan street cleaning plant and $50,000 for increasing one in Brooklyn.

Oakland, Cal.—Will vote on September 27 on bond issue, as follows: Stone culverts, $50,000; wharf improvements, $15,000; cemetery creek improvements, $80,000; West Oakland Park, $30,000; Sixth Ward Park, $40,000; Second Ward Park, $25,000; De Fremery Park, $95,000; Lather Park, $450,000; Independence Park, $20,000; Bushrod Park, $33,000; park south of Twelfth street dam, $185,000; park west of Lake Merrit, $160,000. City Clerk.

Saginaw, Mich.—Ordinance passed authorizing street committee to purchase a street sweeper at once. City Clerk.

San Francisco, Cal.—Will sell on October 3 the following bonds: $328,000 Golden Gate and Presidio extension; $596,000 Telegraph Hill Park; $740,000 children's playground; $292,000 Mission Park.

Wabash, Ind.—Bids wanted September 12 for a 10-ton garbage crematory. City Engineer.

Washington, D. C.—The $15,000 voted by Congress for improvements to Rock Creek National Park will include the purchase of a road sprinkler.

Wilmington, Del.—Will spend $10,000 on park improvements. City Clerk.

CONTRACTS AWARDED

Binghamton, N. Y.—Contract for concrete river protection wall, to A. L. Willey, at $17,833.

Dayton, O.—Contract for eight garbage wagons to M. and L. Webber, at $269 apiece.

Long Island City, L. I., N. Y.—Contract for garbage crematory reported let to William Nolan, at $24,575.

New Orleans, La.—Executive Committee recommends that contract for sewage pumping station be let to W. M. Wren & Co., at $135,063.54.

New Bedford, Mass.—Awarded garbage collection and disposal contract to New Bedford Extractor Company, at $25,500 per year for ten years.

Saugerties, N. Y.—Contract for sewage disposal works and parts of sewage system, to Wieber & Watson, Kingston, at $69,086.

Proposals for Water Meters.

BLOOMFIELD, NEW JERSEY.

Sealed proposals will be received at the office of the Clerk of the Town of Bloomfield, N. J., until 8 o'clock P. M. Tuesday, September 6, 1904, for furnishing and delivering f. o. b. cars at Bloomfield, N. J., 500 or more ⅝inch Water Meters.

Each bidder must state the composition of the body or shell of the meters as well as a general description of the meters proposed to be furnished. Each bid must be indorsed "Proposals for Furnishing Water Meters" and addressed to Wm. L. Johnson, Town Clerk, Bloomfield, Essex County, N. J.

The Town Council reserves the right to reject any or all bids.

By order of the Town Council.

WM. L. JOHNSON, Town Clerk.

Proposals for Sewers.

The city of Perry, Iowa, will construct a system of sewers, and Chairman B. C. Dilenbeck is asking for sealed bids for plans and specifications.